Information Circular 90-1

NEW BRUNSWICK'S MINERAL INDUSTRY 1989

Edited by
Barbara M.W. Carroll

Minerals and Energy Division
Department of Natural Resources and Energy
Province of New Brunswick

1990

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Department of Natural Resources and Energy
Fredericton, New Brunswick

To all user groups:

I take great pride in presenting the "New Brunswick's Mineral Industry, 1989" report. This report will undoubtedly be of great interest to the mining community.

The government of New Brunswick recognized the importance of the mining industry by appointing a Minister of State for Mines, Honourable Edmond Blanchard, in June of 1989. This reflects the increasingly important role of the mining industry in New Brunswick's economic growth.

It is my hope that this report will be of help to all those contributing to the prosperity of this industry.

Yours sincerely,

Morris Green

MORRIS GREEN
Minister of Natural Resources and Energy

Ministère des Ressources naturelles et de l'Énergie
Fredericton (Nouveau-Brunswick)

À l'attention de tous les utilisateurs
Madame, Monsieur,

C'est avec grand plaisir que je vous présente le rapport 1989 sur l'industrie minière du Nouveau-Brunswick. Ce rapport intéressera sans aucun doute les intervenants de tous les niveaux de l'industrie.

Le gouvernement du Nouveau-Brunswick a reconnu l'importance de l'industrie minière en nommant l'honorable Edmond Blanchard ministre d'État aux Mines, en juin 1989. Ceci reflète le rôle de plus en plus prépondérant de l'industrie minière dans la croissance économique provinciale.

J'espère sincèrement que ce rapport s'avérera utile à tous ceux et celles qui contribuent à tous ceux et celles qui contribuent à la prospérité de l'industrie.

Veuillez agréer, Madame, Monsieur, l'expression de mes sentiments les meilleurs.

Le ministre des Ressources naturelles et de l'Énergie,

Morris Green

MORRIS GREEN

Department of Natural Resources and Energy
Fredericton, New Brunswick

To all user groups:

It is an honour to be associated with the Department of Natural Resources and Energy in presenting this report to the mining community.

As Minister of State for Mines, I have addressed issues of great importance for the continued growth of the industry, such as exploration, reclamation, and sustainable development, and I am confident that the mining industry will continue to prosper in the years to come.

I wish to thank the Minister, Honourable Morris Green, the Department of Natural Resources and Energy, and more specifically the Minerals and Energy Division for their continuous support in my first year in office.

Yours sincerely,

EDMOND BLANCHARD
Minister of State for Mines

Ministère des Ressources naturelles et de l'Énergie
Fredericton (Nouveau-Brunswick)

À l'attention de tous les utilisateurs
Madame, Monsieur,

C'est avec plaisir que je m'associe au ministère des Ressources naturelles et de l'Énergie afin de vous présenter ce rapport qui intéressera certainement tous les représentants de l'industrie minière.

En tant que ministre d'État aux Mines, je me suis attaqué à une série de questions de toute première importance en ce qui a trait à la croissance à long terme de l'industrie, soit la prospection, la restauration et le développement soutenu et j'ai la certitude que notre industrie continuera de prospérer au cours des années à venir.

Enfin, j'aimerais remercier l'honorable Morris Green, ministre des Ressources naturelles et de l'Énergie, le ministère, et plus particulièrement le personnel de la Division des minerais et de l'énergie pour leur soutien continu au cours de cette première année dans l'exercice de mes fonctions.

Veuillez agréer, Madame, Monsieur,
l'expression de mes sentiments les meilleurs.

Le ministre d'État aux Mines,

EDMOND BLANCHARD

Department of Natural Resources and Energy
Fredericton, New Brunswick

The Honourable Morris Green
Minister of Natural Resources and Energy
Fredericton, New Brunswick

Sir:

I am pleased to submit for your approval "New Brunswick's Mineral Industry, 1989," a report of mining activities compiled by the staff of the Minerals and Energy Division.

This publication includes information that is not contained in the Department's regular series of reports. It is a historical record of exploration, development, mining, and government activities that have taken place within New Brunswick during 1989.

Yours sincerely,

BRYAN J. WALKER
Deputy Minister

Ministère des Ressources naturelles et de l'Énergie
Fredericton (Nouveau-Brunswick)

L'honorable Morris Green,
ministère des Ressources naturelles et de l'Énergie
Fredericton (Nouveau-Brunswick)

Monsieur,

J'ai l'honneur de vous soumettre, aux fins d'approbation, "L'industrie minière du Nouveau-Brunswick 1989", rapport sur les activités minières compilé par le personnel de la Direction des minerais et de l'énergie.

Cette publication comprend de l'information qui n'a pas été présentée dans la série de rapports régulière du ministère. Il s'agit d'un registre permanent d'activités minières, gouvernementales, d'exploration et de développement qui ont eu lieu au Nouveau-Brunswick en 1989.

Veuillez croire, Monsieur le ministre, à l'assurance de mes sentiments respectueux.

Le sous-ministre,

BRYAN J. WALKER

ACKNOWLEDGEMENTS

The staff members of the Minerals and Energy Division and others who have contributed sections to this report are:

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Kim O'Donnell and Freda Kelly contributed to the typing of this report and Gerry Johnson drafted maps and graphs. The photographs were obtained from staff, the Division's collection, and Eric Bagnell of Communications Branch.

SUMMARY

The Minerals and Energy Division of the New Brunswick Department of Natural Resources and Energy manages the mineral resources owned by the Crown. Responsibilities include conducting basic geoscientific studies, maintaining scientific and technical data to aid mineral exploration, developing mineral management policies, issuing licences and leases, administering acts and regulations related to minerals and mining, and monitoring mining activities. Staff geologists and engineers work with other government departments, companies, and organizations on matters related to forestry, environment, and construction. The Division published 540 maps and reports in 1989.

Prospectors, and exploration and mining companies staked 8736 claims during 1989, mainly in search of zinc, lead, copper, and gold. The two main areas of interest were the Bathurst-Newcastle district and a large area along the Bay of Fundy. In addition, there was interest in the Province's limestone, gypsum, dolomite, aggregate, stone, and peat resources.

In 1989, Marshall Mineral Corp. (Restigouche) registered a proposal with the Department of the Environment to operate an open pit mine, and Stratabound Minerals Corp. (Captain North Extension) made plans to remove a 12 000 t bulk sample. Burnt Church Peat Moss Co. Ltd. and Jiffy Products (N.B.) Ltd. are conducting resource evaluation studies on bogs in the northeast.

During the year there were six producing metal mines and twenty-nine producing nonmetallic operations; two companies were involved in gas and coal production. The Lake George stibnite mine (Dominion Explorers Inc.) ceased mining in January 1990, and East West Caribou Mining Ltd. temporarily shut down the Caribou zinc-lead-copper mine to arrange refinancing, which should allow the mine to recommence operations in 1990. Two new metal mines came on stream; Murray Brook Resources Inc. began mining gold-bearing gossan in October, 1989, and Heath Steele Mines Ltd. reopened its base metal mine in the third quarter of the year.

The value of minerals produced in New Brunswick in 1989 was $909 547 000, down slightly from the previous year. The value of metals and fuels increased slightly, while those of nonmetals and structural materials decreased from the previous year. Compared to mineral production in other Canadian provinces, New Brunswick's production ranked first in antimony and bismuth; second in clay products, lead, peat, and sulphur; third in silver and zinc; and fifth in copper and stone.

SOMMAIRE

La Division des minerais et de l'énergie du ministère des Ressources naturelles et de l'Énergie du Nouveau-Brunswick est chargée de la gestion des ressources minérales de la Couronne. Parmi les responsabilités imparties à cette division, on note la tenue d'études géoscientifiques de base, le maintien à jour des données scientifiques et techniques servant à la prospection minière, la conception de politiques de gestion minière, la

délivrance de permis et de baux, l'administration des lois et des règlements relatifs aux minerais et aux mines ainsi que le contrôle des activités minières. Les géologues et les ingénieurs de la Division travaillent en étroite collaboration avec les autres ministères ainsi qu'avec les représentants d'entreprises et d'organismes, sur les questions relatives à la foresterie, à l'environnement et à la construction. En 1989, la Division des minerais et de l'énergie a publié 540 cartes et rapports.

Les prospecteurs miniers ainsi que les sociétés d'exploration et les sociétés minières ont jalonné un total de 8736 claims au cours de l'année 1989, surtout pour la recherche de zinc, de plomb, de cuivre et d'or. Les deux principales régions prospectées se trouvaient dans le district de Bathurst-Newcastle et en bordure de la Baie de Fundy. On s'est également intéressé aux ressources en calcaire, en gypse, en dolomite, en aggrégats, en pierre et en tourbe de la province.

En 1989, la Marshall Mineral Corporation (Restigouche) a présenté au ministère de l'Environnement une proposition en vue de l'exploitation d'une mine à ciel ouvert. Stratabound Minerals Corporation (Captain North Extension) a pour sa part planifié de procéder à l'enlèvement d'un échantillon global de 12 000 tonnes. Burnt Church Peat Moss Co. Ltd. et Jiffy Products (NB) Ltd. effectuent quant à eux l'évaluation des ressources des tourbières du nord-est de la province.

Au cours de l'année, six mines métallifères et 29 installations de production non métallifère étaient en exploitation. Deux compagnies produisaient du charbon et du gaz. La mine de stibine de Lake George, propriété de Dominion Explorers Inc., a cessé ses activités en janvier 1990, tandis qu'East West Caribou Mining Ltd. suspendait temporairement l'exploitation de la mine Caribou, productrice de zinc, de plomb et de cuivre, en vue du refinancement de ses activités. La mine Caribou devrait réouvrir ses portes au cours de l'année 1990. Deux nouvelles mines métallifères sont entrées en activité. Murray Brook Resources Inc. a en effet commencé à exploiter un gisement aurifère en octobre 1989 alors que Heath Steele Mines Ltd. a réouvert sa mine de métaux communs au cours du troisième trimestre de l'année.

La veleur des minéraux produits au Nouveau-Brunswick en 1989 a atteint la somme de 909 547 000 $, ce qui représente une légère baisse par rapport à l'année précédente. La valeur des métaux et des combustibles a augmenté légèrement, tandis que celle des non-métaux et des matériaux de construction a baissé par rapport à l'année précédente. La production minière du Nouveau-Brunswick, par rapport à celle des autres provinces canadiennes, s'est classée au premier rang pour l'antimoine et le bismuth, au deuxième pour l'argile, le plomb, la tourbe et le soufre, au troisième pour l'argent et le zinc et au cinquième pour le cuivre et la pierre.

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CHAPTER 1. GOVERNMENT ORGANIZATION AND PROGRAMMES

MINERALS AND ENERGY DIVISION

New Brunswick, like other Canadian provinces and territories, has traditional responsibilities for mineral resources it owns and controls. The Minerals and Energy Division manages, via a number of Acts, all matters related to mineral exploration, mine development, mineral processing and mine reclamation.

The Division promotes the mineral resource potential of the province and encourages exploration and mining. However, it strongly supports an attainment of a balance between the preservation of the environment and economic development.

The Division clientele are primarily mineral resource companies, but geoscience information generated by staff is extremely important to sound management of forest, water and land resources.

The Division comprises three branches: Planning and Administration, Geological Surveys, and Mineral Development. The details of their operations are set forth in the following pages.

PLANNING AND ADMINISTRATION BRANCH

In June of 1989, the Honourable Edmond Blanchard was appointed Minister of State for Mines. As a result of organizational changes at this time, the Planning and Administration Branch was established within the Minerals and Energy Division of the Department of Natural Resources and Energy (Figures 1a, 1b, 1c, and 1d).

The Branch comprises the Director's office and two sections: the Geoscientific Information Section and the Administration Section (Figure 1b). Garry B. MacEwen is Director.

This Branch is responsible for providing the economic and financial analysis required to develop mineral management policies and programmes; evaluating federal and other provincial government policies and programmes that affect the management of mineral resources; co-ordinating the development and administration of federal/provincial mineral development agreements; coordinating legislative, regulatory, and programme initiatives that the Department wishes to carry forward to the Legislature; coordinating geoscientific information and events for public and industry consumption; and providing administrative support to the Minerals and Energy Division in the area of budgets, staff, and financial information.

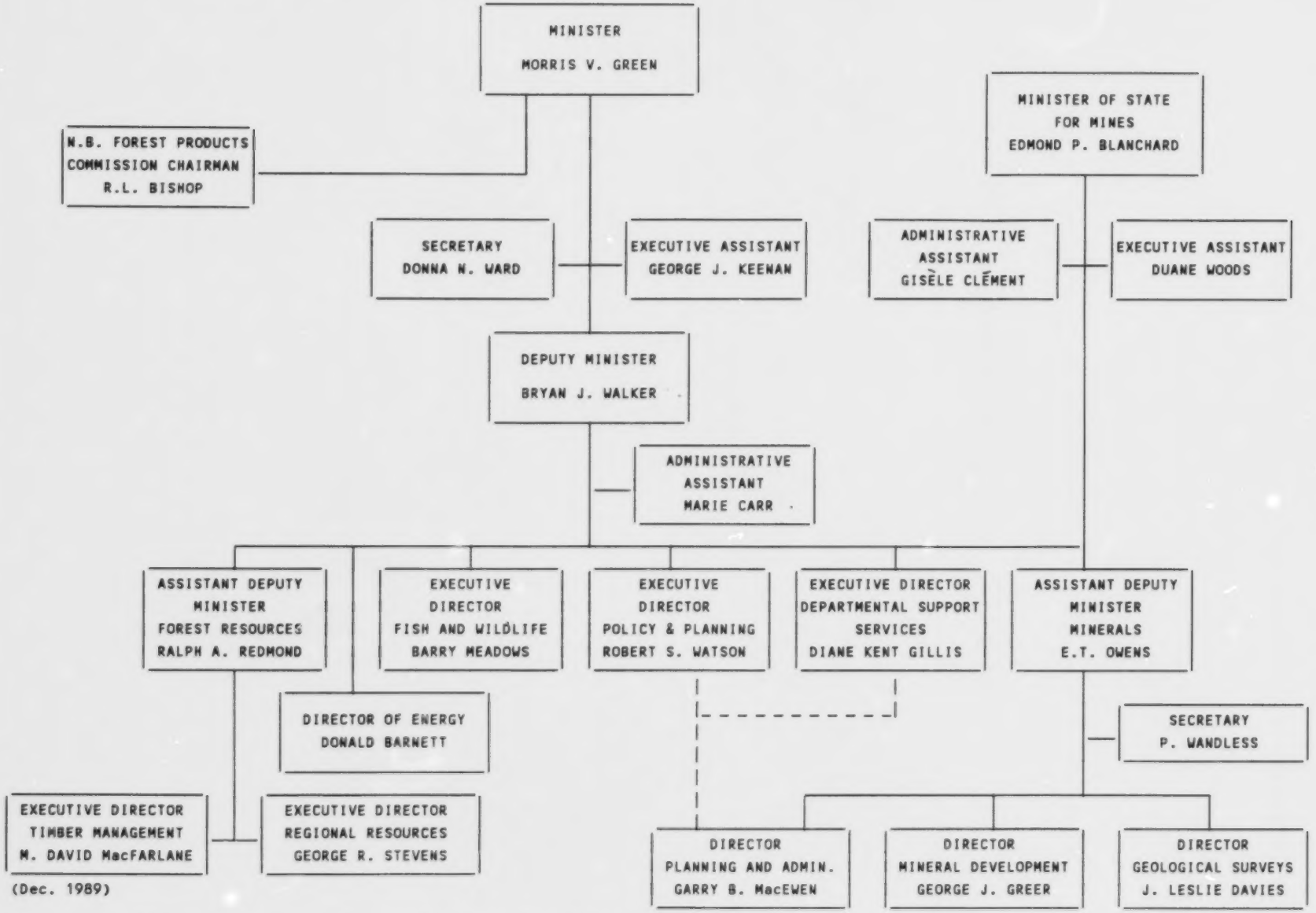

Figure 1a. Plan of organization, New Brunswick Department of Natural Resources and Energy.

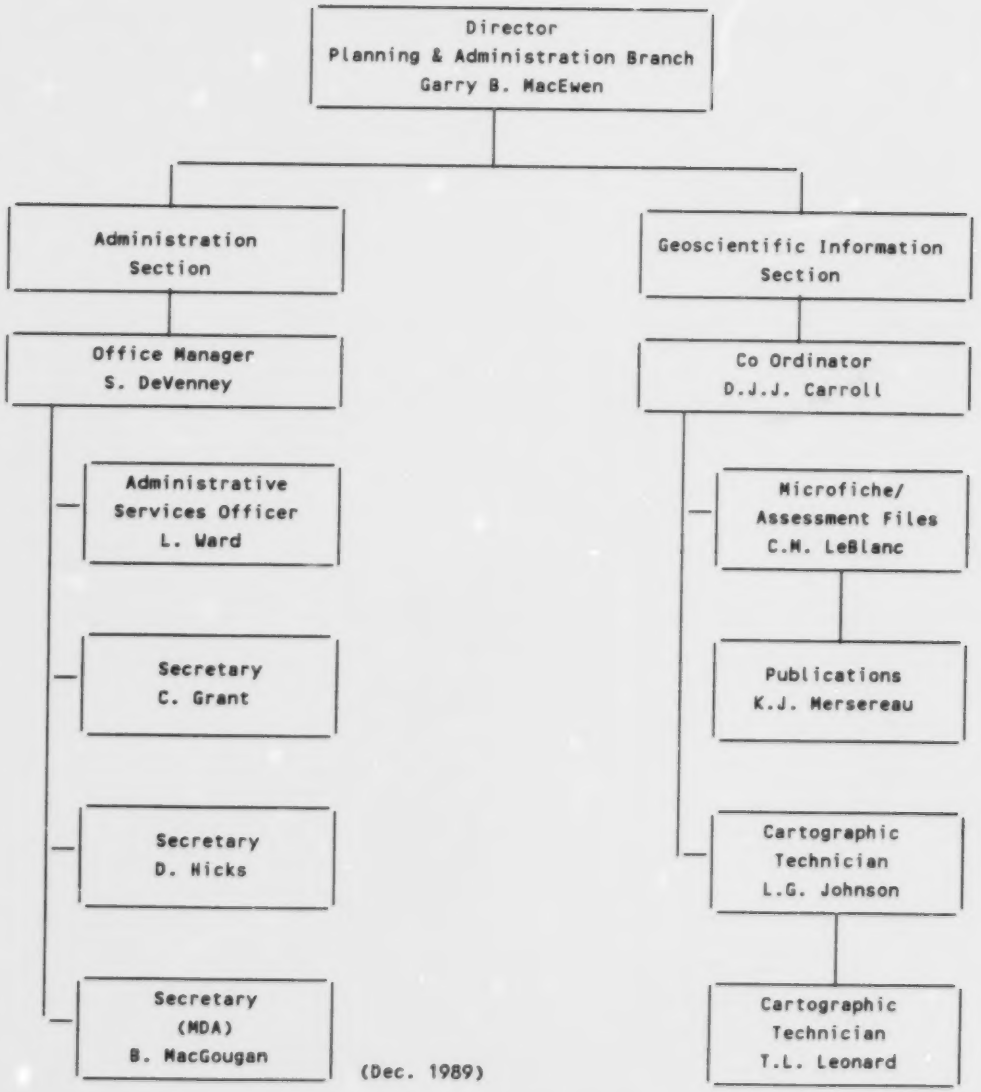

Figure 1b. Organization chart for Planning & Adminstration Branch

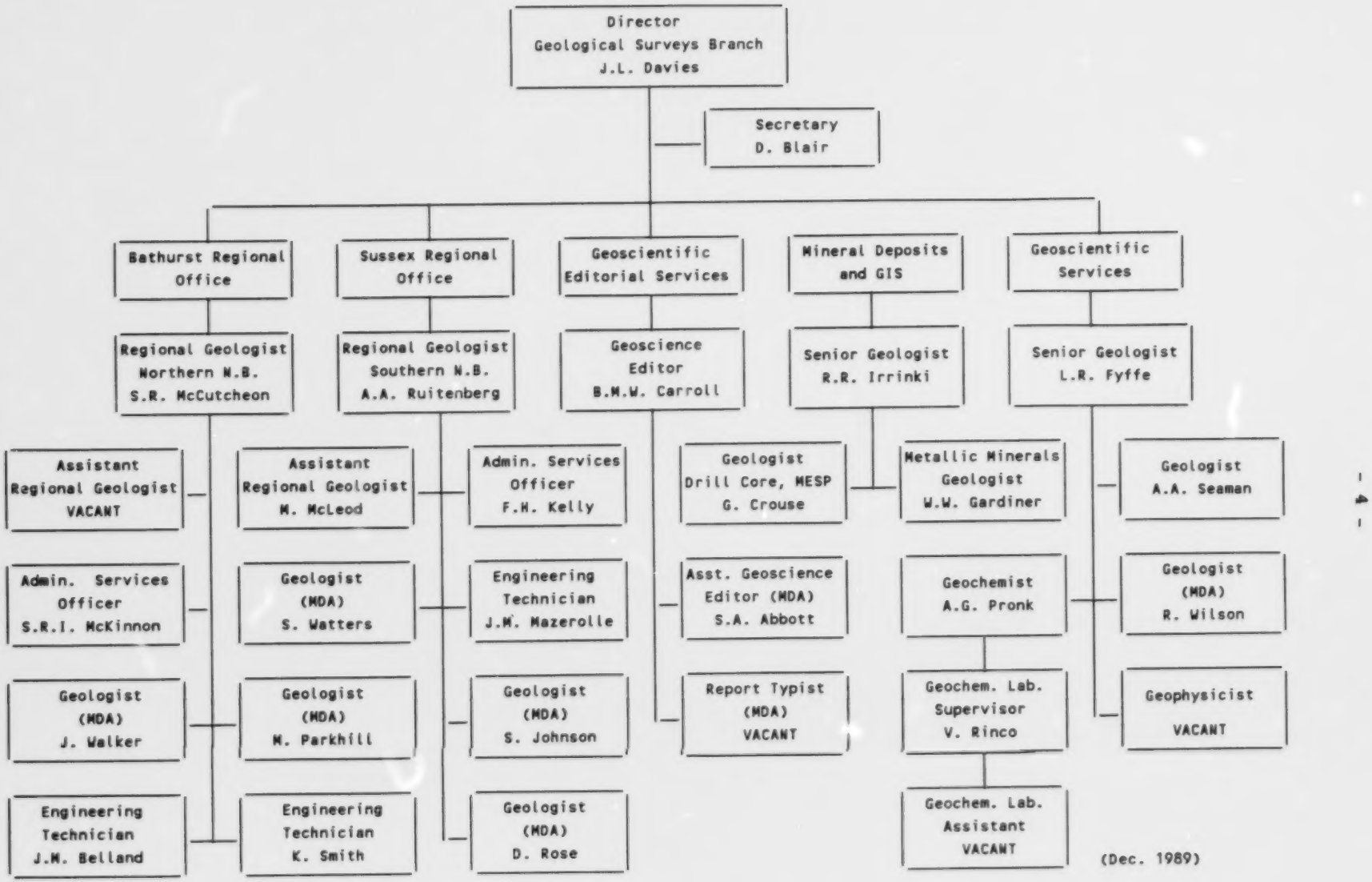

Figure 1c. Plan of organization, Geological Surveys Branch.

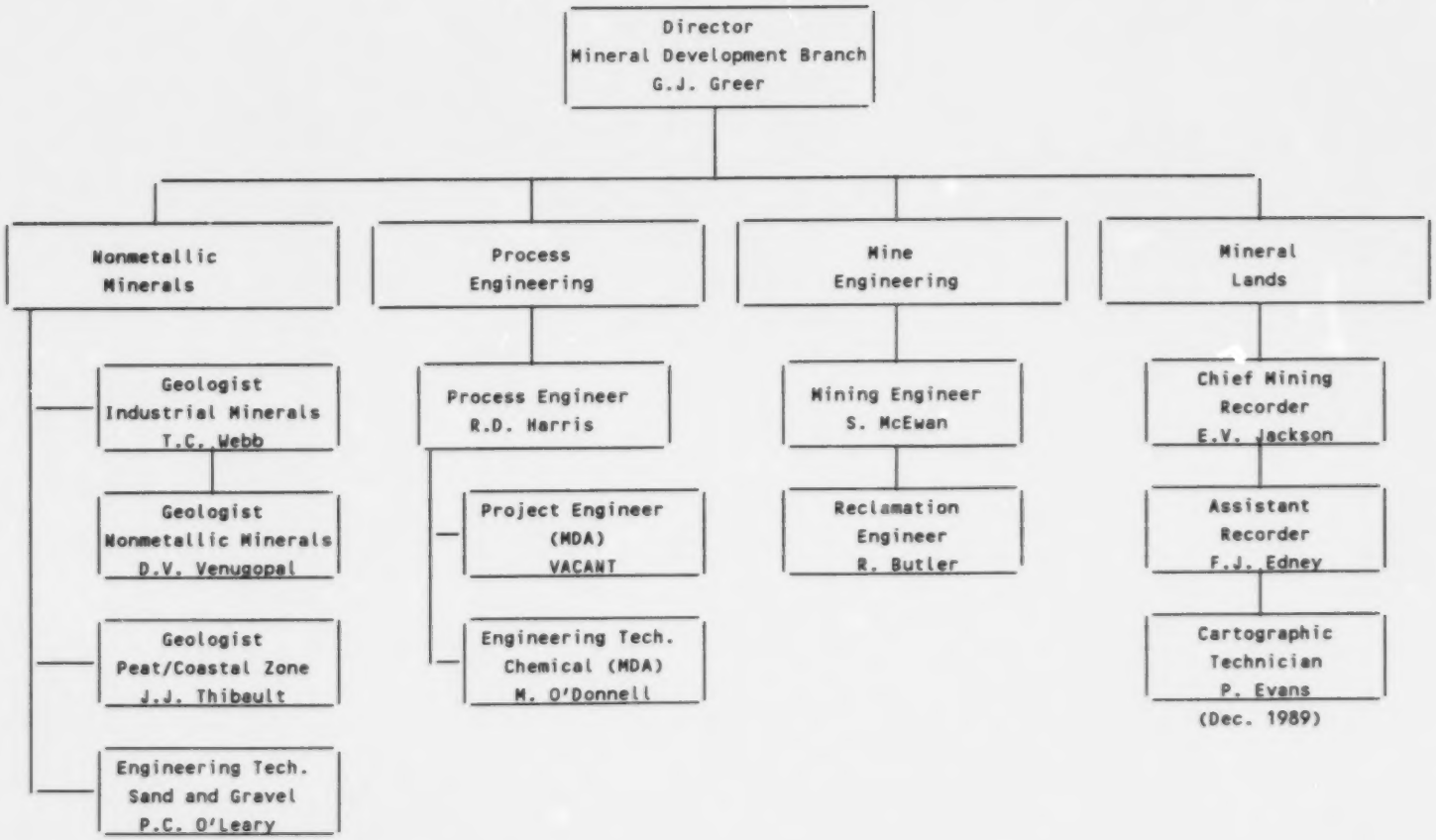

Figure 1d. Plan of organization, Mineral Development Branch.

Geoscientific Information Section

The Geoscientific Information Section consists of the following staff members: Donald J.J. Carroll (Coordinator), L. Gerard Johnson (Cartographic Technician), Terry Leonard (Cartographic Technician), Ken Mersereau (Publications Officer), and Carol M. LeBlanc (Microfiche/ Assessment Files Officer). The Section is made up of two work units: Geoscientific Cartographic Services and Geoscientific Information Services (Figure 1b).

The Geoscientific Information Section is responsible for providing a variety of geoscientific, technical, and support services to the staff of the Minerals and Energy Division. In addition, the staff of the Section provide assistance to the public, in particular the mineral industry, by supplying publications on the geology and mineral resources of the Province.

The year 1989 represented a period of increased activity for the staff of the Section. This was due to several factors, the two main ones being the increase in mineral exploration activity in the Province and the increase in scientific work being published and released under the Canada - New Brunswick Mineral Development Agreement (1984-89).

Some of the activities carried out during the 1989 calendar year are summarized below.

GEOSCIENCE PUBLICATIONS Geoscientific Information Services plays an important role in the dissemination of geoscientific data to the mineral exploration industry as well as to engineers, consultants, and the general public. This section also distributes data on New Brunswick that has been prepared by or for the Geological Survey of Canada. Some of these were funded under the Canada - New Brunswick Mineral Development Agreement.

In 1989, the Geoscientific Information Section released about 540 publications consisting of plates (mainly maps) and reports involving three public releases of Geological Survey of Canada geochemical survey results and four releases of the Minerals and Energy Division geological and geochemical survey results. These surveys were funded under the Canada - New Brunswick Mineral Development Agreement (1984-89). The releases are listed below.

Geological Survey of Canada maps and reports were released on the following dates:

July 27, 1989 — Report: Regional stream sediment and water geochemical reconnaissance data, New Brunswick. (sediments: Zn, Cu, Pb, Ni, Co, Ag, Mn, As, Mo, Fe, Hg, LOI, U, F, V, Cd, Sb, W, Ba, Sn, Au; waters: U, F, pH) (NTS 21 O/3). Geological Survey of Canada, Open File 1953.

August 17, 1989 — Report: Regional stream sediment and water geochemical reconnaissance data, New Brunswick. (sediments: Zn, Cu, Pb, Ni, Co, Ag, Mn, As, Mo, Fe, Hg, LOI, U, F, V, Cd, Sb, W, Ba, Sn, Au; waters: U, F, pH) (NTS 21 O/1E, 21 P/4W). Geological Survey of Canada, Open File 1954.

August 17, 1989 Report: Regional stream sediment and water geochemical reconnaissance data, New Brunswick. (sediments: Zn, Cu, Pb, Ni, Co, Ag, Mn, As, Mo, Fe, Hg, LOI, U, F, V, Cd, Sb, W, Ba, Sn, Au; waters: U, F, pH) (NTS 21 O/8E, 21 P/5W). Geological Survey of Canada, Open File 1955.

Minerals and Energy Division maps and reports were released on the following dates:

June 27, 1989 Report: Gossan target and lineament extraction from satellite imagery, southwest of Heath Steele, New Brunswick. (parts of NTS 21 O/1 and 21 O/8). Geological Notes Series PM 89-21. Plates 89-21A, 21B, and 21C accompany this report.

June 27, 1989 Report: Lithogeochemistry (Co, Ni, Cu, Zn, Pb, As, Mo, Ag, Sb, W, Au, Pt, Pd) of the McAdam-St. Croix River area, New Brunswick. (NTS 21 G/11c, 21 G/11d, and 21 G/6e). Geological Notes Series P.M. 89-70. Plate 89-70 accompanies this report.

July 27, 1988 Report: Surficial geology, till geochemistry (Au, Ag, As, Hg, Sb, Cu, Pb, Zn, Co, Ni, Mo, Mn, Fe, and W) of Riley Brook map area, New Brunswick. (NTS 21 O/3). Geological Notes Series P.M. 89-71. Plates 89-71A, 71B, 71C, and 71D accompany this report.

November 16, 1989 Maps: Surficial geology, till geochemistry (Au, Ag, Sb, Cu, Pb, Zn, Mo, W, Co, Ni, V, Fe, Mn) and till pebble lithologies of the Rollingdam map area. (NTS 21 G/6). Plates 88-15A, 15B, 15C, and 15D.

The distribution and sales of geoscience publications from the Fredericton office in the 1989 calendar year totalled 9145 maps and reports, representing revenue of $20 500. The majority of these sales were to individuals working for the mineral exploration industry.

MINERAL EXPLORATION ASSESSMENT FILES A total of 200 assessment files were received by the Mining Recorder's office in the 1989 calendar year. Because of the increase in quantity and volume of submitted material only 50% of these reports were indexed for the GEOSCAN data base by the year's end.

AUDIOVISUAL PRODUCTS The Geoscientific Information Services unit maintains a library of audiovisual productions related to the geology and mineral resources of New Brunswick as well as additional programmes that may be of interest to the general public. The following videos were added to the Division's collection in 1989.

1. "Transformations" - (video)
2. "Treasures from Below" - (video)
3. "High Tech Mining/Striking the Motherlode" - (video)

Figure 2. The Honourable Morris Green, Dr. J. Leslie Davies and Robert Stairs in the "rock room" at the Annual Meeting and Convention of the Prospectors and Developers Association in Toronto.

Figure 3. One of the professional meetings attended by Division staff was the GAC/MAC Annual Meeting held in Montreal. Donald Carroll tended the display, which is of interest to a number of the delegates.

Anyone wishing to borrow these audiovisual programmes are requested to contact the Geoscientific Information Section in Fredericton (P.O. Box 6000, Fredericton, N.B. E3B 5H1).

PUBLIC AWARENESS ACTIVITIES During 1989 the Geoscientific Information Section was once again involved in activities to increase the general public's awareness of New Brunswick's rich and diversified mineral resources. Several discussions were held with the New Brunswick Mining Association Promotion Committee on the topic of increasing the profile of New Brunswick's mineral sector. In November of this year, the Association officially premiered its new video called "Treasures from Below" at the Minerals and Energy Division's annual Review of Activities. In addition, the Association's new colour brochure highlighting its members and their products was released.

In conjunction with the goal to communicate the importance of the mineral industry as well as to publicize the work done under the Canada - New Brunswick Mineral Development Agreement (1984-89), the Section was involved in the production of several displays and attended the following meetings and conferences where these display units were set up:

1. 58th Annual Meeting and Convention of the Prospectors and Developers Association, Toronto; March (Figure 2)
2. Geological Association of Canada/Mineralogical Association of Canada (GAC/MAC) Annual Meeting, Montreal; May (Figure 3)
3. Ports Canada - Fifth International Business Conference, Saint John; June
4. Saint John Port Days, Saint John; October
5. 14th annual Review of Activities (Minerals and Energy Division), Fredericton; November

EDUCATION PROJECT During 1989, Ms. Gwen Martin of Language Unlimited continued to research the history of mining in the Province. This project is being funded by Energy, Mines and Resources Canada, Communications Branch, under the Canada - New Brunswick Mineral Development Agreement (1984-89) and is scheduled for completion by March 1990.

REVIEW OF ACTIVITIES The 1989 Review of Activities of the Minerals and Energy Division was held at the Fredericton Inn on November 20th and 21st. Despite the advent of the first major winter storm, more than 220 individuals representing the mineral industry, university, general public, research institutions, consulting firms, and various federal and provincial government departments were in attendance (Figures 4 and 5). In addition to technical sessions, there was a poster session consisting of more than 30 exhibits of on-going projects, including those funded under the MDA. Delegates to the Review of Activities were invited to attend the New Brunswick Prospectors and Developers Association meeting (Figure 6) and the Open House of the U.N.B Geological Engineering Society, both of which preceded the Review.

Figure 4. Leslie R. Fyffe and William H. Poole examine rock samples exhibited at the 14th annual Review of Activities in Fredericton.

Figure 5. Two southern New Brunswick prospectors, Edgar Brown and Reginald Cox, examine rocks collected by staff of the Sussex Regional Office.

Figure 6. Honourable Edmond Blanchard addresses the meeting of the New Brunswick Branch of the Prospectors and Developers Association. Seated are Robert Stairs and Donald Burton.

MINING WEEK In order to create a better understanding of the mining industry's social and economic importance, the Department of Natural Resources and Energy, in cooperation with the mineral resource sector, proclaimed May 28 - June 3, 1989 as Mining Week in New Brunswick. The Department's Communications Branch coordinated the week's activities, which included media tours of selected mine sites: Potash Company of America and Denison-Potacan Potash Company mines near Sussex; NB Coal Limited mine near Minto (Figure 7); Brunswick Mining and Smelting Corporation Limited base metal mine southwest of Bathurst; Murray Brook Resources Inc. base metal-gold-silver mine west of Bathurst; and East West Caribou Mining Limited base metal mine west of Bathurst.

To date, New Brunswick and British Columbia are the only two provinces to inititate such a promotion. Since this was the Province's first Mining Week, it is anticipated that Mining Week will become an annual event and, with cooperation from industry associations, will become bigger and better as time goes on.

Administration Section

Administration Section staff includes Sandra DeVenney (Office Manager), Linda Ward (Administrative Services Officer), Carol Grant (Secretary), Denise Hicks (Secretary), and Barbara MacGougan (Secretary, MDA).

Figure 7. Members of the New Brunswick media, invited to tour selected mines during Mining Week, are at the NB Coal Limited operation in the Minto area. A Marion 8200 dragline with a 106 m boom and a 50 m^3 bucket is shown in the background.

The Section assists in the budget process for each fiscal year. Branch directors are provided with up-to-date financial information during budget preparation and throughout the fiscal year. The Section is responsible for staffing matters, including providing information on staffing procedures, salaries, bargaining and non-bargaining units, classifications, procedures for hiring, and liaison with the Human Resources Branch. The Section supports Division objectives by assisting with equipment and material procurement.

Provincial and Federal/Provincial agreement budgets for the Division (1989-90) are summarized below and in Figure 8.

Provincial Budget		Federal/Provincial Budget	
Mineral Development Branch	- $ 563 700	Mineral Development Agreement	- $1 342 516
Geological Surveys Branch	- 1 381 100		
Planning and Administration	- 548 200		
Minister of State for Mines	- 150 000		
	$2 643 000		

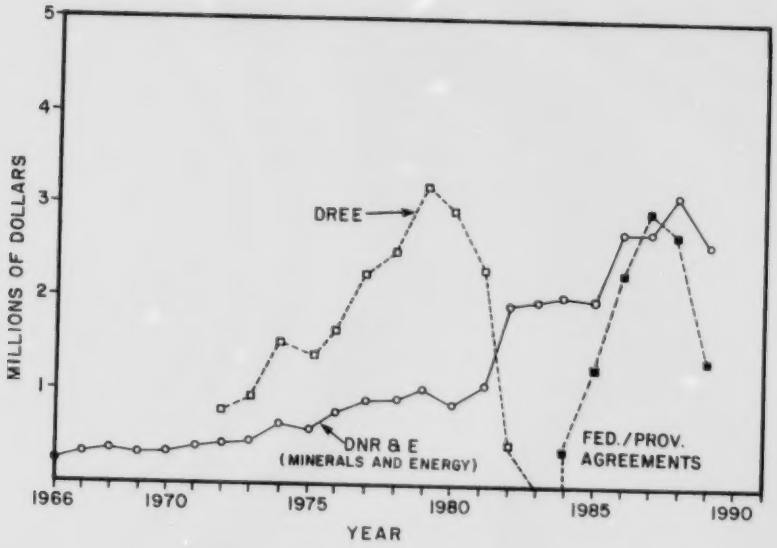

Figure 8. Budget of Minerals and Energy Division, 1966-1989. The Energy Agreement was not included in 1989. (Values have not been adjusted to account for inflation.)

GEOLOGICAL SURVEYS BRANCH

The Geological Surveys Branch consists of the Sussex Regional Office, the Bathurst Regional Office, the Geoscientific Services Section, the Mineral Deposits and Geographic Information Systems (GIS) Section, and the Geoscientific Editorial Services Section (Figure 1c). Dr. J.L. Davies is Director.

The Geological Surveys Branch is responsible for the collection, interpretation, dissemination, and management of geoscience data in New Brunswick. The Branch goals are to decipher the regolith and bedrock framework of the Province, and to identify the mineral resource potential of the various geological terranes. Closely related activities include: encouraging mineral exploration; promoting the mineral industry; and advising government on management of mineral, water, and land resources.

The provincial "A" budget for the Geological Surveys Branch in 1989-90 amounts to $1 381 100, down from $1 550 000 in 1988/89. Two of the new geoscientist positions provided from the 1988/89 budget were filled. A.G. Pronk was hired a a geochemist, and W.W. Gardiner was engaged as a mineral deposits geologist. The third position was cancelled before a geophysicist could be hired. The funds remaining in the sixth (carry over) year of the Geoscience programme (Canada - New Brunswick Mineral Development Agreement) were sufficient only for contract salaries and printing costs of final reports and maps.

Bathurst Regional Office

In 1989, the staff of the Bathurst Regional Office (Figure 1c) consisted of Dr. Steven R. McCutcheon (Regional Geologist), Jim MacIntosh (Assistant Regional Geologist), Sharon McKinnon (Administrative Services Officer), Maurice Belland and Kevin Smith (Engineering Technicians). K. Smith started work in January as the interim replacement for Andy LeBlanc, who took a one-year leave of absence. S. McCutcheon successfully defended his doctoral thesis at Dalhousie University in August. J.A. MacIntosh accepted a long-term disability pension in September.

Andrew Brewer, Mike Parkhill, and Jim Walker, contract geologists responsible for projects funded through the Canada - New Brunswick Mineral Development Agreement (MDA), also worked out of the Bathurst office. Because another federal-provincial minerals agreement has not been signed, A. Brewer left the Department in October in order to accept employment with NovaGold Resources Inc. Because of hiring restraints, his position remained vacant.

CANADA - NEW BRUNSWICK MDA PROJECTS The Upsalquitch Forks (J. Walker) and Charlo River (A. Brewer) projects (Figure 9) were completed except for editing and publication. Output from the Upsalquitch Forks project will include a Report of Investigation accompanied by a two-colour, 1:50 000 scale geological map. There are twenty-five 1:10 000 scale maps from which the 1:50 000 map was compiled. The Charlo River project will include a Report of Investigation accompanied by seven 1:20 000 scale geological maps. A two-color, 1:50 000 scale geological map covering most of the project area (21 O/15E and 21 O/16W) will also be published.

In the Neipisiguit Lakes map area (Figure 9), M.A. Parkhill continued 1:50 000 scale surficial mapping and till sampling (one sample every 4 km^2). This area has a similar geologic setting to the Riley Brook (21 O/3) area to the southwest, mapped during 1988, and the Upsalquitch Forks (21 O/10) area to the north, mapped previously, and was also the subject of bedrock investigation by R.A. Wilson. The results of this Canada - New Brunswick MDA project will be summarized in a Report of Investigation and a series of maps at 1:100 000 scale covering 21 O/9, 21 O/10, and 21 O/15.

Bedrock mapping and till geochemical studies are planned in the Nepisiguit Lakes map area (NTS 21 O/7) as part of the proposed Canada - New Brunswick minerals agreement.

The 1:10 000 scale compilation maps of assessment data from NTS 21 O/8 (Geoscience Compilation project, Figure 9) were released in June. Some of the results of the Heath Steele project were also released in June but most were released in October.

PROVINCIAL PROJECTS Three new projects were started in 1989 using the remaining MDA (1984-89) funds for salaries and provincial funds for field work. The Antinouri-Nicholas project (Figure 9), conceived as a 5-year project under the proposed Canada - New Brunswick minerals agreement,

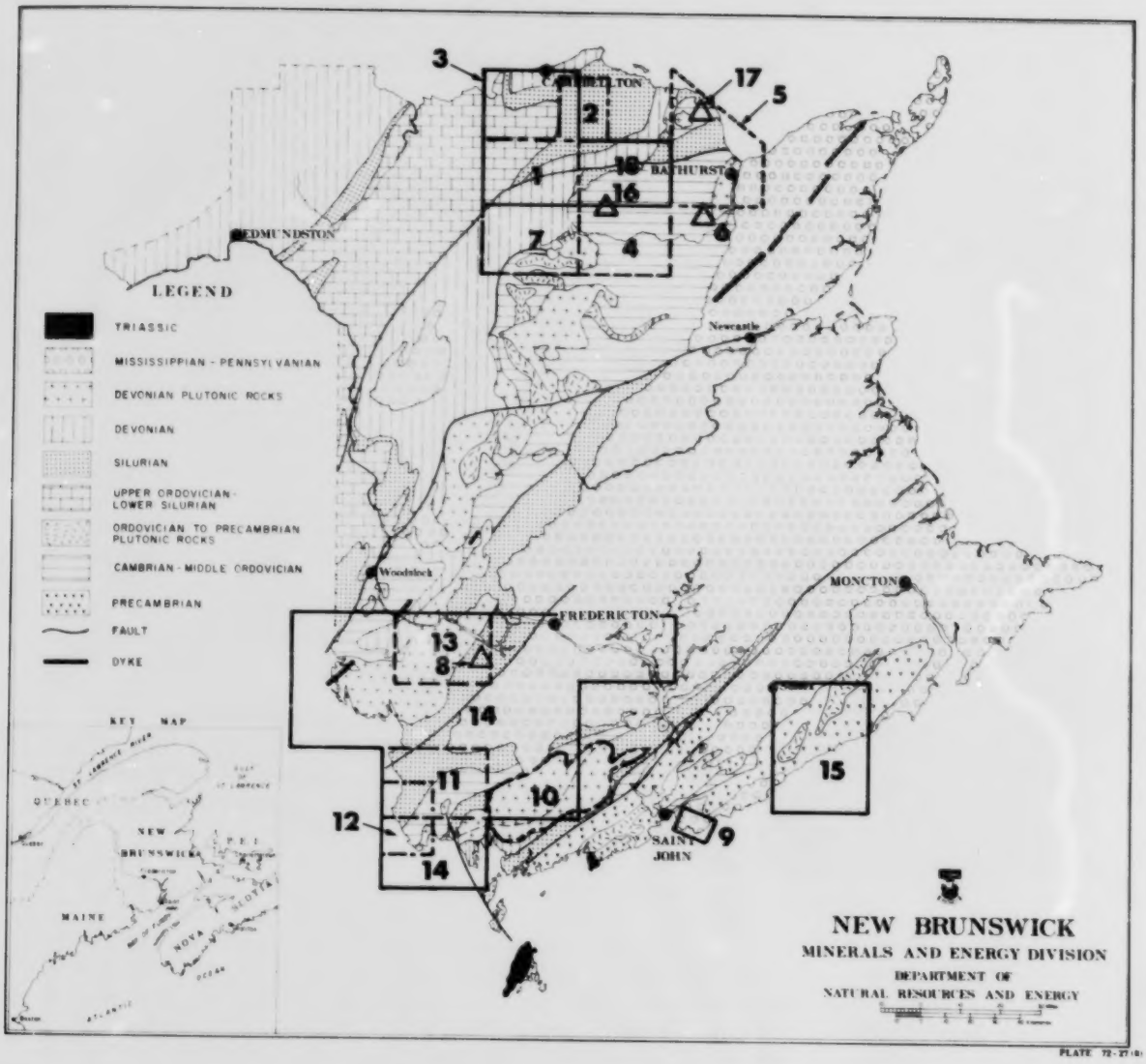

Figure 9. Areas in which Geological Surveys Branch projects were conducted in 1989: (1) mapping and lithogeochemical sampling, Upsalquitch Forks; (2) mapping, Charlo area; (3) till mapping, NTS 21 O/9, 10, 15; (4) geoscience compilation, 21 O/8; (5) Antinouri-Nicholas project; (6) Brunswick project; (7) till/bedrock, Nepisiguit Lakes project; (8) structural controls, Lake George antimony mine; (9) structural study, Cape Spencer; (10) mapping, Saint George Batholith; (11) surficial geology/geochemistry, Rollingdam area; (12) mapping, Moores Mills area; (13) stream-sediment/water survey, Pokiok Batholith; (14) glacial deposit study, southwest New Brunswick; (15) till, Waterford and Salmon River area; (16) Murray Brook deposit study; (17) Turgeon deposit study; (18) California Lake GIS project, 21 O/8.

Figure 10. Jim Walker and Shyann LeBlanc traversing Taylor Brook, northeast of Bathurst.

will be a study of the mineral occurrences/deposits in the Bathurst and Pointe Verte map areas (21 P/12 and 21 P/13, respectively). A two-person party (J. Walker and S. LeBlanc) was in the field for part of the summer (Figure 10).

The Brunswick project (Figure 9), a stratigraphic and litho-geochemical study of igneous and sedimentary rocks associated with the "Brunswick horizon," evolved from a sampling programme carried out around the mined-out No. 6 open pit in 1989 by M. Belland. This year, selected drill cores from the area between No. 6 and No. 12 were logged and sampled by A. Brewer and B. MacEachen. The objective of this project is to determine the stratigraphic volcanological setting of the Brunswick base-metal deposits.

OTHER ACTIVITIES S.R. McCutcheon gave a talk at the Atlantic Geoscience Society Annual Meeting in Amherst describing the petrographic and

lithogeochemical evidence that the Brunswick No. 6 massive sulphide deposit is sediment hosted. The abstract of this talk was published in Volume 25 of Atlantic Geology. A poster display on the same topic was presented at the Annual Meeting and Convention of the Prospectors and Developers Association in Toronto and the Geological Association of Canada Annual Meeting in Montreal (Figure 3).

Advice was given to the Department of the Environment regarding the Newcastle water supply. The new water source is adequate in quantity but of poor quality because of its high manganese content.

Assistance was rendered to Dr. J. Greenough of Mount Allison University, who collected suites of samples for lithogeochemical study from several areas having ancient hydrothermal environments, e.g., Turgeon, Brunswick No. 12, and Popelogan. The object of Dr. Greenough's study is to understand the geochemical behavior of platinum-group metals in these environments.

Field trips were made to mineral properties held by the following companies and prospectors: Brunswick Mining and Smelting Corporation Limited, East West Caribou Mining Limited, Corona Corporation, Noranda Exploration Company, Limited, NovaGold Resources Inc., Rio Algom Limited, Stratabound Minerals Corp., Westminer Canada Limited, W. Carroll, O. O'Connell, J. Duffy, O. Hickey, and F. Cady. Also, core from a hole drilled by Sharpe Energy and Resources Limited at Bruce Siding was examined and samples were collected for further study at the Research and Productivity Council (RPC) in Fredericton.

M. Belland prepared a layman's account of the history of the Austin Brook and Brunswick No. 6 deposits. His manuscript will be published as a Popular Geology Paper.

K. Smith drafted the geological maps for the Upsalquitch Forks project; he also drafted new base maps and made corrections to the geological overlays for the Charlo River project.

Sussex Regional Office

In 1989, the staff of the Sussex Regional Office (Figure 1c) consisted of Arie A. Ruitenberg (Regional Geologist), Malcolm J. McLeod (Assistant Regional Geologist), Maurice Mazerolle (Engineering Technician), and Freda Kelly (Administrative Services Officer). Susan C. Johnson, Sheila E. Watters, and David G. Rose were employed on long-term contracts associated with the Canada - New Brunswick Mineral Development Agreement. Angela Roy was employed during the summer and fall seasons.

PROGRAMMES AND PROJECTS M.J. McLeod, S.C. Johnson and A.A. Ruitenberg compiled the regional geology of and field checked problem areas in the western part of NTS 21 H. This project is part of a regional 1:250 000 compilation and mapping programme of southern New Brunswick that

will be completed under the auspices of the proposed Canada - New Brunswick minerals agreement. The most important result of the project in 1989 was the delineation of a major fault zone that separates the Late Precambrian Avalon (Caledonia) and the Ordovician St. Croix tectonostratigraphic terranes. Numerous gold occurrences of economic interest have been found locally in this fault zone, which is actively being explored by several mining companies and prospectors.

A.D. Roy and S.E. Watters mapped several critical sections in the underground workings of the Lake George antimony mine (Figure 9) prior to its closing on January 19, 1990. The objective of the project was to establish the structural controls of the antimony- and gold-bearing vein systems and to assist in exploration for additional ore reserves in the mine area and surrounding region. The emphasis of the project was in the structurally complex west end of the mine workings. The attitudes and offsets along the faults are generally consistent with a south-directed thrust-wrench fault system. Repeated reactivation of this fault system has resulted in the intrusion of lamprophyre dykes, the emplacement of the vein system, and the offsetting of the vein system in the western part of the mine.

D.G. Rose and S.C. Johnson edited data in the computerized mineral occurrence file to assure accuracy and consistency. A final report on the project accompanied by a copy of the data base on diskettes will be published in 1990. During the summer of 1989, D.G. Rose began field examination of selected mineral occurrences. The area completed is covered by NTS map sheet 21 H. The results of the field examination and assays were incorporated into the computerized data base.

S.E. Watters continued with the preparation of a detailed report on the structure and alteration associated with the gold deposits in the Cape Spencer area southeast of Saint John (Figure 9). The deposits are associated with a major Hercynian thrust zone in which Precambrian granitoids and volcanic rocks are juxtaposed on Carboniferous and older sedimentary rocks. The first phase of Hercynian deformation produced regional scale northeast-trending recumbent folds and an associated axial surface cleavage. The second deformation produced northwest and southeast dipping thrust faults with associated northeast-trending overturned folds. The gold deposits occur in mylonitized granitoids and sedimentary rocks associated with the thrust zone.

M.J. McLeod completed a detailed report and geologic maps of the Saint George Batholith and associated mineral deposits (Figure 9). The Batholith comprises three suites. The Late Silurian suite has no potential for metallic mineral deposits, but it contains high-quality building and monumental stone. Gold deposits of economic interest are associated with the Early Devonian suite. Tin and tungsten deposits are associated with the Late Devonian suite.

A.A. Ruitenberg, S.C. Johnson, and L.R. Fyffe completed a paper on gold deposits and their tectonic setting in New Brunswick. The paper was accepted for publication by the Canadian Institute of Mining and Metallurgy Bulletin.

Figure 11. Reginald Cox, a well known New Brunswick prospector, at the high-grade Tower Hill gold prospect, northeast of St. Stephen.

At the request of the editors of DNAG (Decade of North American Geology), A.A. Ruitenberg and L.R. Fyffe prepared a report on the characteristics and tectonic setting of granitoid-related deposits in New Brunswick. The report will also be published by the Division as a Geoscience Report.

P.G. Chiswell completed a report on the surficial geology and geochemistry of the Rollingdam area, Charlotte County (Figure 9). This area contains several high-grade gold occurrences. The report will be published as a Report of Investigation. The accompanying maps were published in 1989.

Consultations were provided for many geologists, prospectors, and engineers during the year (Figure 11). The main interest was in gold deposits in the Caledonia Zone coastal area east and west of Saint John, and the central and northeastern St. Croix and Mascarene zones. There was also renewed interest in tin exploration in the southwestern part of the Province.

Geological advice related to forest site classification was provided to foresters employed by government and the forest industry. Regolith maps are presently available for about eleven per cent of the province. The maps provide basic data on nutrient potential, internal drainage, resistance to acid rain, and general ground conditions. These maps also provide essential information for the selection of waste disposal sites and highway construction.

Geoscientific Services Section

The Geoscientific Services staff, located at the Hugh John Flemming Forestry Centre in Fredericton, consists of Les Fyffe (Senior Geologist), Allen Seaman (Quaternary Geologist), Toon Pronk (Geochemist), and Valeria Rinco (Geochemical Analyst). Reg Wilson (Project Geologist) carried out a contract mapping project under the Canada-New Brunswick Mineral Development Agreement.

Reg Wilson mapped the bedrock geology of Nepisiguit Lakes (21 O/7W) map area (Figure 9) and completed mapping begun in 1988 in the Riley Brook area (21 O/3E and 21 O/2W). The Nepisiguit Lakes area is underlain by Early Devonian volcanic and sedimentary rocks of the Tobique Group. Trace-element analyses indicate that the volcanics are a bimodal suite of basalts and rhyolites deposited within a continental-rift setting. Epithermal alteration zones within the felsic volcanic rocks contain lead-zinc mineralization associated with elevated gold values. Previous results from the New Denmark area are to be published as a Report of Investigation.

Reg Wilson prepared a display that was exhibited at the Prospectors and Developers Association Annual Meeting in Toronto, and at the Geological Association of Canada/Mineralogical Association of Canada Joint Annual Meeting in Montreal, 1989. The title of the display was, "Preliminary geology and lithogeochemistry of selected rock samples from the Riley Brook area, New Brunswick."

Les Fyffe mapped the bedrock geology of the Moores Mills area in Charlotte County (parts of 21 G/3 and 21 G/6), southwestern New Brunswick on a 1:20 000 scale (Figure 9). The survey completes coverage between Rollingdam and the Maine border. Because of the discovery of a fossil locality during this investigation, significant revision was made to the stratigraphy of the Cookson Group. In addition, a major fault was found to separate the Ordovician Cookson Group from the Silurian Flume Ridge Formation to the north. This fault zone contains quartz-vein swarms and quartz-feldspar porphyry dykes; it apparently localized emplacement of the Mount Pleasant caldera.

Les Fyffe presented a talk in February, 1989, at the Atlantic Geoscience Society Colloquium in Amherst, Nova Scotia, entitled "Tectonic significance of Ordovician basalts in the St. Croix Terrane of coastal Maine and New Brunswick." A talk entitled "The St. Croix Terrane of southwestern New Brunswick: Proposed relationships to Gander and Avalon terranes based on new palaeontological, structural, and geochemical evidence" was given by Les Fyffe at the Lithoprobe East Transect Meeting held in St. John's, Newfoundland on October 19 and 20, 1989. Other talks given at this meeting described the recent deep seismic results from the Newfoundland on-land transect and related geological and geochemical work. The delineation of fault structures by a high-resolution seismic survey in the Buchans area was of particular interest since this method may have applicability in the Bathurst-Newcastle mining camp.

The Bibliography of New Brunswick Geology (1839-1988) compiled by Les Fyffe and Diane Blair is now available as Geoscience Report 89-3 and on a computer data base. The bibliography includes references to the geoscientific literature accumulated over the past 150 years, beginning in 1839 when the Provincial government issued Abraham Gesner's first of four reports on the geology of New Brunswick. It supersedes a compilation published by the New Brunswick Research and Productivity Council in 1969. The 2800 entries in this updated version include approximately 1400 references from the RPC edition, as well as references to the post-1969 geological literature. Federal and provincial government reports, together with papers from geoscientific and technical journals comprise the majority of entries, but theses, field guides, consultant reports, and articles from books and newspapers are also listed. Each entry presents the following information: author(s), year of publication, title of article, source, and page numbers.

Papers, describing the geology of the Dunnage and Gander zones in New Brunswick by Cees van Staal and Les Fyffe and the tectonic setting of granitoid-related mineral deposits in New Brunswick by Art Ruitenberg and Les Fyffe, have been prepared for a DNAG (Decade in North American Geology) volume on the Appalachian Orogen. A summary of the chemistry of volcanic rocks in New Brunswick, Nova Scotia, and the Eastern Townships of Quebec is being prepared by Les Fyffe and Sandra Barr for the same volume.

In 1980, a peculiar boulder was found to the west of Magaguadavic Lake by David and Mack Jones of Woodstock, New Brunswick. The origin of the spheroidal pattern in the boulder has been reported in a recent Canadian Geographic Magazine article by Les Fyffe entitled, "The moving tale of a New Brunswick boulder." Because of the unusual features of this boulder, Mayor Ralph Annis of McAdam had the boulder moved to his community where it will serve as a tourist attraction (Figure 12).

Liz MacLellan published a paper on the Burnthill tin-tungsten deposits in the Hayesville map area (21 J/10); a Mineral Resource Report will be available in 1990 on the geology of the Burnthill Brook area. Digital LANDSAT imagery maps of the area were prepared by GEODAT Information Services Limited.

GEOCHEMISTRY LABORATORY (Toon Pronk) The laboratory is staffed by Toon Pronk (Geochemist) and Valeria Rinco (Chemical Analyst). Mrs. Bettina Edney retired early in 1989 and the position remained vacant for the remainder of the year, to be filled when the evaluation of the laboratory operation was completed.

The geochemistry laboratory is equipped to analyse Cu, Pb, Zn, Ag, Ni, Co, Fe, and Mn by atomic absorption spectrometry and Sb, W, V, and Mo by various colorimetric methods. Approximately 1000 till samples and 520 drill-core samples were analysed for Cu, Pb, Zn, Ag, Fe, Mn, Co, Ni, Mo, and W by Valeria Rinco at the geochemical laboratory. Core samples from the Carboniferous drilling project are still being analysed using the same methods as at the beginning of the project.

Stream-sediment and water sampling surveys were carried out in the Canterbury area, NTS 21 G/14 (Figure 9). In 1990, the McAdam map area,

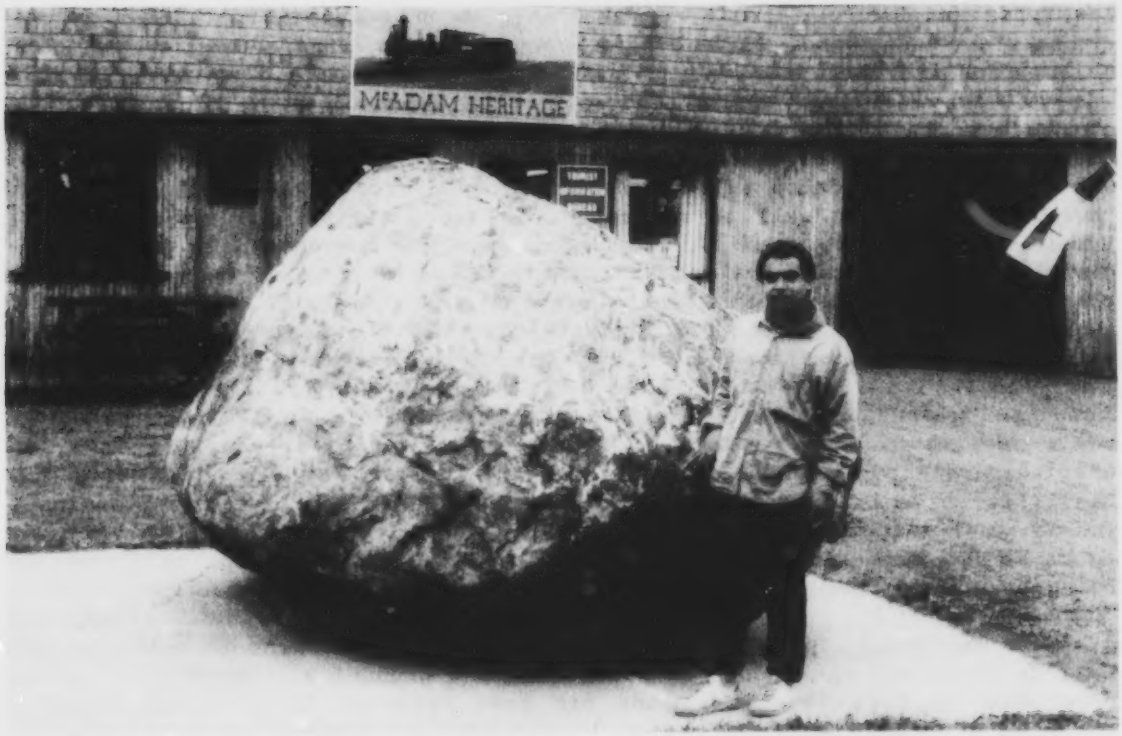

Figure 12. Beuland Bies beside the unusual granite boulder at McAdam.

21 G/11, will be completed, and eventually the entire Pokiok Batholith will be sampled. This survey is being carried out following Geological Survey of Canada standards for National Geochemical Reconnaissance surveys, and sample analyses will also be identical to those for recent Geological Survey of Canada surveys in the Province.

Mike Parkhill and Toon Pronk continued with the surficial geology and till geochemistry project in the Nepisiguit Lakes area (see p. 14).

In January of 1989 Toon Pronk attended the GSC Forum with the theme of "global charge." This symposium emphasized many facets of the work, other than exploration, carried out by the Geological Survey of Canada and other geological survey branches.

QUATERNARY GEOLOGY (A.A. Seaman) Investigation of the glacial deposits and ice-flow direction indicators in southern New Brunswick (1:250 000 scale map sheets, 21 G and 21 H), begun in 1988, continued during 1989 with two separate projects. In southwestern New Brunswick, A.A. Seaman continued regional investigations of ice-flow patterns in Charlotte, Sunbury, and York counties, with work on Campobello Island (NTS 21 B/15), and in the northern and western parts of map area 21 G (NTS 21 G/3, G/6, G/7, and G/10 to G/16) (Figure 9). Examination of till pebble samples from the north-central part of the area resulted in the identification of a

previously unknown north- to northwest-trending ice-flow event. As part of this project, C. Bianchi, an undergraduate student at the University of New Brunswick, conducted a detailed till mapping and sampling survey over a negative radiometric anomaly to the northeast of Mount Pleasant (parts of NTS 21 G/7 and G/10), identified by a Geological Survey of Canada airborne geophysical survey. This north-south-trending radioactivity low has no correlation with topography or known bedrock structures. The purpose of investigating this anomaly is to determine whether it is caused by the surficial materials, and to examine the implications with respect to drift prospecting. In addition, A.A. Seaman assisted Dr. B.E. Broster of the University of New Brunswick with the study of glaciotectonically deformed weathered granite in the Charlie Lake area (in map area 21 G/14).

In southeastern New Brunswick, M. Foisy conducted till mapping and sampling (at a reconnaissance level of one sample per 16 km^2) of the Waterford (NTS 21 H/11) and Salmon River (NTS 21 H/6) map areas (Figure 9), covering parts of Kings, Saint John, and Albert counties. He also recorded striae trends at many sites, and discovered evidence for an ice-flow event trending toward the northwest, a direction of flow previously unknown from the area.

Mike Parkhill and Toon Pronk continued with the surficial geology and till geochemistry project in the Nepisiguit Lakes area (see p. 14).

A.G. Pronk, P.T. Bobrowsky (Geological Survey of Canada) and M.A. Parkhill published a paper on "An interpretation of late Quaternary glacial flow indicators in the Baie des Chaleurs region, northern New Brunswick" in the journal Géographie physique et Quaternaire. In addition, A.G. Pronk and M.A. Parkhill presented a paper entitled "Why Laurentide ice indicators are absent in the Baie des Chaleurs region, northern New Brunswick," at the 1989 Colloquium of the Atlantic Geoscience Society in Amherst, Nova Scotia, and another, entitled "The Appalachian glacier complex: an analog to the Cordilleran ice complex" at the 1989 Canadian Quaternary Association (CANQUA) conference in Edmonton, Alberta. At this meeting the 1991 CANQUA meeting was awarded to Fredericton and will be hosted by the University of New Brunswick (Dr. B. Broster, Chairman). A.A. Seaman also presented a paper at the CANQUA conference, entitled "Late Wisconsinan glaciation and deglaciation of the St. Croix Highlands area, southwestern New Brunswick."

Mineral Deposits and GIS Section

The Geological Surveys Branch created this section in order to give a higher profile to the Mineral Deposits and Geographic Information Systems (GIS). The section is staffed by R.R. Irrinki (Senior Geologist), W.W. Gardiner (Mineral Deposits Geologist), and G.W. Crouse (Core Manager and MESP Coordinator). W.W. Gardiner began his employment with the Department in September, 1989. L.W. McNeill, on loan from the Information Systems Branch of the Department, is working as the operator of the Geographic Information Systems. P. Rennick, project geologist, was hired to computerize drill-hole data and carry out geological mapping of the Murray Brook deposit and surrounding area (Figure 9).

MINERAL DEPOSIT INVENTORY (R.R. Irrinki and P. Rennick) Work continued on the computerizaton of drill-hole data on major metallic mineral deposits in New Brunswick. The drill-hole information on Lake George, Turgeon, and Murray Brook deposits has been entered into the data base.

Several cross sections, longitudinal sections, and plans outline favourable targets for antimony and gold exploration at the Lake George deposit. These results have been discussed with Dominion Explorers Inc.

An internal study was conducted on the Turgeon deposit (Figure 9), which entailed construction of several cross sections, longitudinal sections, and plans. Probable in situ reserves were then estimated.

DRILL CORE MANAGEMENT (Greg Crouse) The drill core repositories in Bathurst, Fredericton, and Sussex received numerous visitors in 1989, several of whom sampled core for analysis.

Approximately 21 000 m of drill core was donated to the Province this yea.. Approximately 10 200 m of this core was from Mount Pleasant in southwestern New Brunswick and approximately 4100 m was from Halfmile Lake in the Bathurst camp. The remainder was derived from exploratory drilling in 1989. Thousands of metres of core that remain at Halfmile Lake will be moved to Madran when money is available.

Drill core was sorted and moved into sheds that were constructed in 1988. Most of the core that was on the ground is now in racks.

The Department's computerized data base for storing drill core information is being updated.

MINERAL EXPLORATION STIMULATION PROGRAMME (MESP) (Greg Crouse) MESP provides financial assistance to mineral exploration companies and prospectors who would like to carry out exploration for minerals within the Province. It is a direct private sector assistance programme offered by the Department of Natural Resources and Energy. This popular programme, first offered in 1988, was continued in 1989.

A committee of government and private sector representatives reviews applications for MESP grants and, if approved, up to $3000 per prospector is available. The committee members are R.R. Irrinki, L.R. Fyffe, A.A. Ruitenberg, S.R. McCutcheon, D. Hoy, and G.W. Crouse. Eligible work would include: regional and detailed prospecting, grid establishment, geological mapping, geophysical and geochemical surveys, trenching and drilling, assays and chemical analysis, and specialized work such as mineralogy.

The committee reviewed 22 applications and approved 14 for funding. A total of $30 000 was awarded to participants.

GEOGRAPHIC INFORMATION SYSTEM (GIS) (R.R. Irrinki) In 1989, Minerals and Energy Division and Department of Commerce and Technology jointly funded a pilot project on Geoscience Information System (GSIS). The system is a combination of computer hardware and software that is capable of manipulating geoscience data. The California Lake (NTS 21 O/8) area (Figure 9) was chosen for the pilot project because of the availability of 1:10 000 digital base maps, pre-plotted assessment data, and the availablity of numerous geoscience data sets.

The hardware configuration of the system consists of one Sparc 370 server, one Sun-4 workstation, one 48" x 36" digitizing table and one 48" x 36" pen plotter. UNIX is the operating system for the hardware; CARIS is the GSIS software that manages the graphic data base; and INGRES is the alphanumeric data base used for textual management.

Several data sets have been either manually digitized or manipulated from the existing digital files and then integrated into GSIS. The data sets consist of base maps; geocompilation data; geological, geophysical, and geochemical data; mineral occurrences and deposits; sand and gravel pits; drill hole data; and mineral claim, mining, and reclamation data.

MURRAY BROOK SULPHIDE DEPOSIT STUDY (Paul Rennick) The Murray Brook deposit (Figure 9) is owned by NovaGold Resources Inc. The sulphide deposit and overlying gossan have been evaluated by surface diamond drilling. Computerized data bases have been compiled from available drill-hole data.

Detailed mapping at 1:10 000 scale was carried out during the 1989 field season. Drill core was relogged and sampled. As a result of this mapping project, two new sulphide occurrences were discovered. The first, a massive sulphide body, occurs approximately 1400 m southeast of the Murray Brook deposit at a longitude 66°25'31" and latitude 47°31'02". The second discovery, consisting of semi-massive pyrite, is located approximately 500 m east of the Murray Brook deposit at longitude 66°25'31" and latitude 47°31'37".

Drill-hole plans, longitudinal sections, and cross sections of the Murray Brook deposit have been constructed using updated drill-hole data base files.

Geoscientific Editorial Services Section

Staff of this section include Barbara M.W. Carroll (Geoscientific Editor), Shasta A. Abbott (Assistant Geoscientific Editor, MDA), and Karen A. Gallagher (Report Typist, MDA). In December of 1989, Ms. Gallagher transferred to the Department of the Solicitor General.

The Geoscientific Editorial Services Section is responsible for editing scientific reports and maps prepared by Division staff. From time to time, the Division also accepts for publication reports prepared by scientists from other organizations or individual geologists. If requested by the project supervisor, scientific reports received in fulfilment of contract work are edited. In 1989, approximately 70 reports and 470 maps were edited and/or prepared for publication.

MINERAL DEVELOPMENT BRANCH

The Mineral Development Branch is composed of the Director's office and four sectors: Nonmetallic Minerals, Process Engineering, Mine Engineering, and Mineral Lands (Figure 1d). George W. Greer is Director. In 1989-90, the Branch had an "A" base budget of $563 700 and a staff complement of 12 persons.

Activities of the Mineral Development unit include the allocation of mineral rights under the Mining Act and the Quarriable Substances Act, the utilization of minerals and quarriable substances in accordance with maximum extraction techniques both in mining and beneficiation, and the proper reclamation of the disturbed lands. These activities include monitoring the prospecting, exploration, and development stages of the resources as well as scrutinizing production and reclamation plans, and encouraging further processing within the Province. The Branch was also responsible for the execution of three programmes under the Canada - New Brunswick Mineral Development Agreement (1984-89).

The Branch is concerned with the administration of the following Acts: Mining Act, Quarriable Substances Act, Ownership of Minerals Act, and the Metallic Minerals Tax Act. As well, the unit is responsible for carrying out decisions under the Peat Policy, the Potash Policy, and the Coal Policy. Copies of the Acts, as well as Regulations thereunder, are available from the Queen's Printer.

Nonmetallic Minerals Sector

The Nonmetallic Minerals Sector consists of Timothy C. Webb (Industrial Minerals Geologist), D.V. Venugopal (Nonmetallic Minerals Geologist), Jacques J. Thibault (Peat and Coastal Zone Geologist), and Paul C. O'Leary (Engineering Technician, Sand and Gravel).

INDUSTRIAL MINERALS (Timothy Webb) It is becoming increasingly important to sufficiently identify Provincial limestone deposits with respect to quality, apparent reserves, and factors affecting potential development in order to confront the anticipated rigid market requirements of the future. As a move in this direction, the New Brunswick Department of Natural Resources and Energy is currently re-examining and reassessing the Province's limestone resources, found principally in rocks of Precambrian, Silurian, and Mississippian age. The project consists of five main phases that address such topics as historical development and current status of the limestone industry, and practical geologic aspects of known deposits and occurrences. A number of important deposit characteristics (grade ranges, reserves, development potential, etc.) are to be combined into a computerized information retrieval system for quick reference.

The 1989 outputs of the limestone resource inventory project consist of: (a) Draft report and accompanying 1:10 000 scale maps concerning various aspects of Silurian and Ordovician, and Precambrian limestone resources in the Province; (b) Computerized sample inventory having related information on more than 1500 entries; (c) Summary of relevant information for 400

drill holes, and setting up of a computerized data retrieval system; (d) Preparation of a deposit classification and rating scheme for Silurian and Ordovician limestones to indicate future development potential.

Several nonmetallic mineral projects, funded through the Canada - New Brunswick Mineral Development Agreement, were completed in 1989: (1) preparation of a specimen catalogue and colour brochure on New Brunswick's dimension stone resources, (2) a regional reconnaissance of dimension stone resources, (3) a study documenting New Brunswick's building and decorative stone heritage, (4) an assessment of bedrock aggregate resource potential of selected map areas, (5) a cement market review, (6) a mineral filler market review: with potential implications for New Brunswick, (7) a study dealing with promotional avenues pertaining to distribution of information regarding New Brunswick dimension stone resources, and (8) establishment of a data base for granular aggregate resources.

PEAT (Jacques Thibault) Applications continued to be received for Peatland Exploration Licences.

The Mineral Development Branch continued to actively support the Peat Research and Development Centre (PRDC) in Shippagan. Under the Canada - New Brunswick Mineral Development Agreement, three projects were contracted out to the PRDC. One project resulted from concerns raised by Department biologists on the impact of peat mining on moose and waterfowl populations (Figure 13). Results of the study will be published in 1990. Another project, an extension of earlier research into reclamation of abandoned commercial peatlands, tested the reforestation option on two parcels of abandoned peatland (Figure 13). Site preparation was carried out in the fall. Balsam fir and black spruce seedlings will be planted in June, 1990. The third project, jointly funded with the Federal Government, consisted of hosting a technical information seminar on peat. The proceedings of that seminar were published in Open File Report 89-33.

Another project, funded under the Canada - New Brunswick MDA and completed in 1989, assessed the use of SPOT satellite imagery in peatland resource management. The study conclusively established that production surfaces could easily be delineated and that a high proportion of the drainage network on the bog was identifiable. Work was carried out by GEODAT Information Services Limited of Fredericton.

COASTAL ZONE (Jacques Thibault) A paper entitled "Beach Nourishment, Parlee Beach, N.B." was presented at the Second Regional Workshop on Atlantic Shorelines in Charlottetown, P.E.I. The paper was subsequently published in the proceedings of the workshop.

A report on the coastal geology and geomorphology of Caraquet Island (Figure 13) was published as Geological Notes Series PM 89-97.

AGGREGATE MATERIALS (Timothy Webb, Paul O'Leary) In New Brunswick, the rights to quarriable substances, including ordinary stone, building or construction stone, sand, gravel, clay and soil, are vested in the landowner who thereby controls extraction activities. Approximately 42%

of the land area of the Province is Crown land. Removal of aggregate materials from Crown lands is regulated under the Quarriable Substances Act, with permits being issued by the Minister of Natural Resources and Energy.

Production of aggregates from Crown lands in 1989 was 3 248 763 t compared to 2 986 633 t in 1988. Revenue generated from these aggregates in 1989 amounted to $504 859.43.

Process Engineering Sector

In August of 1989, Robert Harris was appointed to the position of process engineer, made vacant by the resignation of Dean Thibault in September of 1988. Mitch O'Donnell (Chemical Engineering Technician, MDA) provided technical support for the process studies.

The process engineering sector within the Department of Natural Resources and Energy is responsible for providing specialist input to the administration of the Mining Act and the Metallic Minerals Tax Act. In accordance with the terms and provisions of these acts, this sector reviews and assesses feasibility reports and research and development projects pertaining to current and developing mineral operations. Another mandate is to review and identify processing opportunities applicable to the Province's mineral industry with the primary aim of promoting growth and development of the industry.

Many of the development initiatives sponsored by this sector are supported and funded by the Canada - New Brunswick Mineral Development Agreement (MDA) under the Economic and Regional Development Agreement. Over the year, several MDA projects and programmes were managed by this sector. They are described below.

POTASSIUM SULPHATE PROCESS DEVELOPMENT STUDY (Figure 13): Over the past five years, the Division has funded a process development initiative aimed at establishing a potassium sulphate manufacturing facility within the Province using new technology. The work completed to date has included bench-scale testing of a process that utilizes locally available potash and gypsum to produce potassium sulphate (fertilizer grade) and by-product calcium chloride (for de-icing). The results have been encouraging, indicating that the chemical reaction mechanisms are sound and should be applicable on a commercial scale. In 1988, a pre-feasibility study was completed on the project by Cambrian Mineral Developments Limited under contract to the Department of Natural Resources and Energy. The economic and marketing components of this study were updated in December of 1989. Plant scale has been evaluated based on yearly potassium sulphate product tonnages of 30 000 and 100 000 tonnes. The economics of scale realized by the latter reflects the better return on investment. The process is considered "environmentally friendly" since it does not produce any significant amount of waste.

Target markets for potential New Brunswick potassium sulphate products are in the eastern United States, Canada, and South America whose current imports originate in western Europe. The calcium chloride product

(approximately 83 000 tonnes based on the larger plant scale) is thought to be marketable in Atlantic Canada and northeastern United States on the basis of a transportation advantage.

The Province of New Brunswick is actively seeking a private developer to bring the project through pilot-scale assessment and ultimately to commercialization. A number of companies, both within and outside the Province, have been contacted over the last two years, but no industry commitments have yet been made.

CUSTOM PROCESSING OF REFRACTORY GOLD This study was contracted to P.J. Whalen, P. Eng., of Fredericton. Its purpose is to review the concept of custom milling the potential refractory gold resources of northern New Brunswick and to assess appropriate processing technologies as a basis for further development. The bench-scale testing was based on a bulk sample taken from Corona's Alcida deposit (Figure 13).

All of the existing and emerging technologies applicable to refractory gold processing were reviewed and the three most promising were selected for the bench-scale test programme and further assessment. They are: pressure oxidation, biological oxidation, and roasting. Considering the current price of gold and the relatively low grade of the deposit, none of the processes assessed was economically viable. (The economics were based on a plant scale of 75 000 oz./year under both integrated and stand-alone plant configurations.) Further exploration is required to prove up ore reserves for a commercial mill. The study was useful in grading the potential of existing technologies to New Brunswick's situation and in bringing to light a few opportunities and constraints to such development. As a follow-up to the process assessment study, Three-D GeoConsultants Limited of Fredericton conducted a resource evaluation that indicated a few interesting possibilities regarding in-province resources. The report may be available in 1990.

COLUMN FLOTATION OF FINE POTASH This study, contracted to the Research and Productivity Council (RPC) of Fredericton, is scheduled for completion in December, 1990.

Column flotation is gaining recognition as an effective means of recovering the finer potash fractions that are not usually recoverable by conventional agitated cells. Concern over the loss of fine potash has prompted interest in processes that will improve mineral recovery. An in-plant column flotation test is currently being carried out at Denison-Potacan Potash Company. Encouraging results have emerged when the column was applied to the scavenger and cleaner circuits. Testing, which will include the use of Potash Company of America's flotation circuit, will continue into the early part of 1990 (Figure 13).

MINERAL INVESTMENT STIMULATION PROGRAMME (MISP) MISP is a financial assistance programme under the MDA, designed to fund mineral development projects proposed by industry. Many proposals were submitted over the year but, because of the lack of funding, only one project was approved.

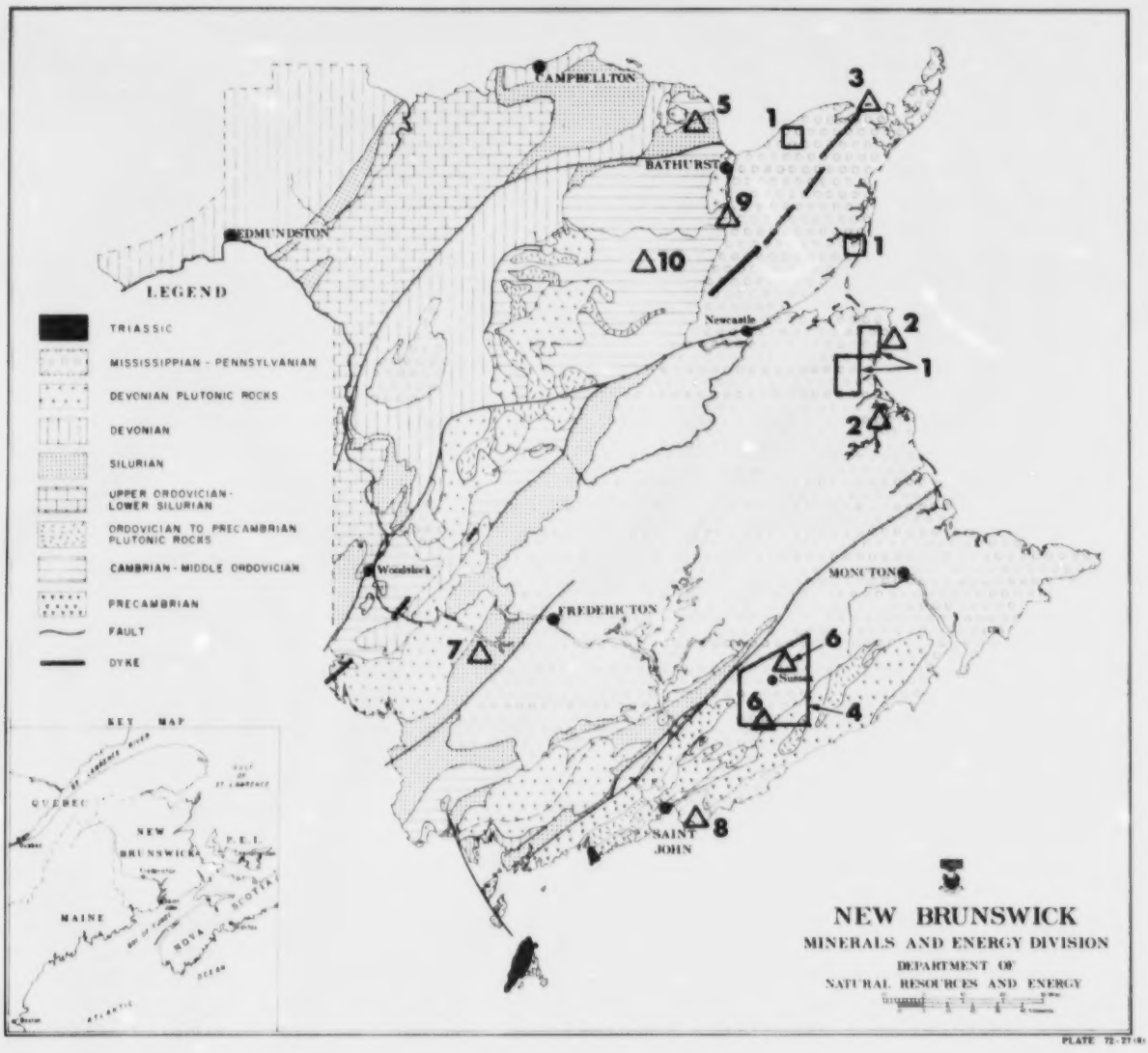

Figure 13. Areas in which Mineral Development Branch projects were conducted in 1989: (1) impact of peat mining on moose and waterfowl; (2) peatland reforestation; (3) geology and geomorphology, Caraquet Island; (4) process to manufacture fertilizer-grade potassium sulphate; (5) custom processing of refractory gold; (6) Column flotation of fine potash; (7) surveying system, Lake George mine; (8) gold recovery, Cape Spencer ores; (9) reclamation, Key Anacon mine site; (10) Heath Steele waste-rock study.

A project submitted by Dominion Explorers Inc. to assess potential improvements to the existing Lake George mine (Figure 13) surveying system was approved. The various automatic surveying instruments tested proved to be significantly more productive than the current manual system. The work is scheduled for completion in early January, 1990.

GOLD RECOVERY OPTIONS FOR CAPE SPENCER ORES (Figure 13) The objectives of this project were to characterize the Cape Spencer ore, to review the existing and developing technologies for gold extraction and recovery, and to assess their effectiveness, based on laboratory test work on the Mispec Resources Inc. property. This study was contracted to the Research and Productivity Council and is scheduled for completion in March, 1990.

The results obtained to date confirmed the nonrefractory nature of the gold and that it is readily recoverable by the cyanide leachant process. The large-scale column leaching experiments were very encouraging since high recoveries of extracted gold were achieved using the sample from Mispec Resources Inc.

MINERAL PROCESSING INVESTIGATION PROGRAMME This is an in-house activity funded under the MDA. Its purpose is to encourage development by seeding mineral processing ideas or concepts. Efforts in 1989 focussed primarily on finishing reports on projects carried out in previous years under the programme. During the year, the following Open File Reports were published: "Prefeasibility of ammonium paratungstate production at the Mount Pleasant tungsten mine" (J.D. Thibault), and "Preliminary Identification of Grade and Recovery Relationships at the Durham Mine Concentrator (J.D. Thibault).

Mine Engineering Sector

The Mine Engineering Sector consists of Samuel K. McEwan, P. Eng. (Mining Engineer) and Robert Butler, P. Eng. (Reclamation Engineer).

The sector is responsible for work of both a specific and general nature relating to the mining industry of New Brunswick. Responsibilities include the monitoring of mining activities; compilation and analysis of mining statistics; administration of the Mining Act; review and evaluation of feasibility reports, annual mining plans, and reclamation reports; and administration of Mineral Development Agreement (MDA) projects.

In addition to these specific tasks, the Mine Engineering Sector liaised with the Federal government and other provincial governments on matters related to the mining industry.

RECLAMATION (Robert Butler) In 1989, there were five reclamation plans submitted for review. As of December 31, 1989, four have been approved.

NB Coal Limited disturbed approximately 120 ha of land in 1989, and has reclaimed in excess of 200 ha. All other mining companies have maintained their reclamation on disturbed land in accordance with their approved schedules.

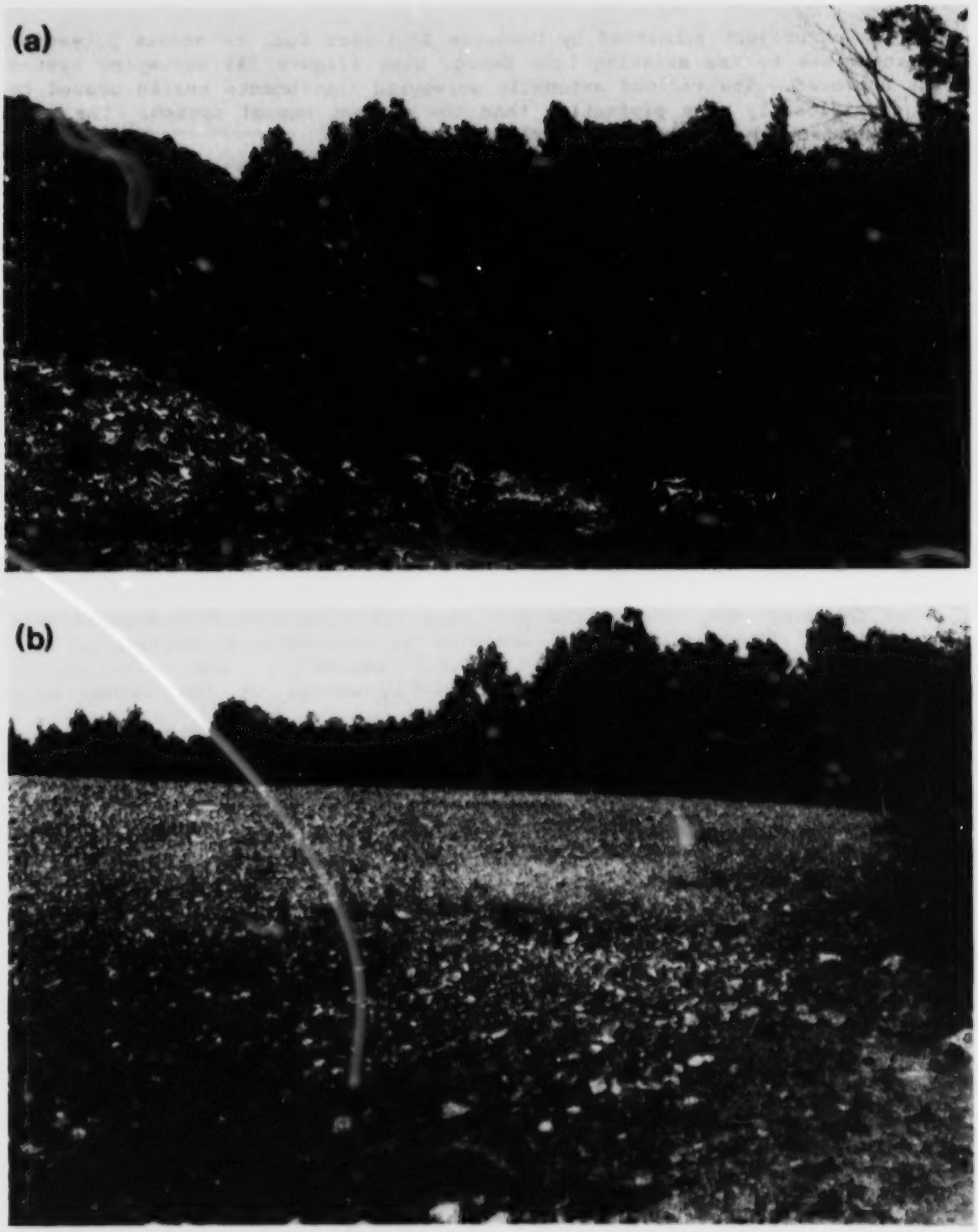

Figure 14. Waste-rock stockpile at the Key Anacon mine site, before (a) and after (b) reclamation

The Key Anacon mine site was reclaimed in the summer of 1989 (Figures 13 and 14). The buildings were razed and the acid-generating mine waste piles were contoured, capped, and revegetated. All the shafts were capped with cement (see p. 75).

The Province has provided financial assistance and technical support on various reclamation and rehabilitation programmes. An example is the support given to Brunswick Mining and Smelting Corporation Limited on its Heath Steele waste-rock study (Figures 13). This project is designed to investigate the capping of waste-rock piles to lower or prevent acid generation. The Province is also supporting two peat bog reclamation projects in the northeast of the Province (see p. 27).

The Department of Natural Resources and Energy has representation on the Technical Working Group of the Mine Environment Neutral Drainage (MEND) programme. MEND is a cooperative programme involving industry and the Federal and Provincial governments. The group coordinates programmes initiated by members who manage and attempt to prevent acid generation from sulphide-bearing mine waste.

The Reclamation Engineer attended the Canadian Institute of Mining and Metallurgy "Tailings and Effluent" symposium held in Halifax, Nova Scotia. He also spoke at the University of New Brunswick's Environmental Studies Workshop I, and gave a lecture to the Geological Engineering class on Mine Environment and Reclamation Engineering.

Mineral Lands Sector

Mineral Lands staff in 1989 consisted of E.V. Jackson (Chief Mining Recorder); F.J. Edney (Deputy Recorder); and P. Evans (Cartographic Technician).

The Mineral Lands Sector processes and maintains records pertaining to the disposition of Crown-owned mineral rights. Mining claims are recorded and prospecting licences are sold in Fredericton and at the regional offices in Bathurst and Sussex.

The number of claims staked in each of the metallogenic zones is illustrated in Figure 15 and the total annual expenditures reported for assessment credit (1954-1989) are given in Figure 16. Table 1 presents mineral lands and exploration statistics for 1989.

MINE TAXATION

Reporting to the Director of Financial Services, the Mine Assessor, W.R. Carr, is responsible for the collection of all revenue due the Province from mineral taxation and royalties.

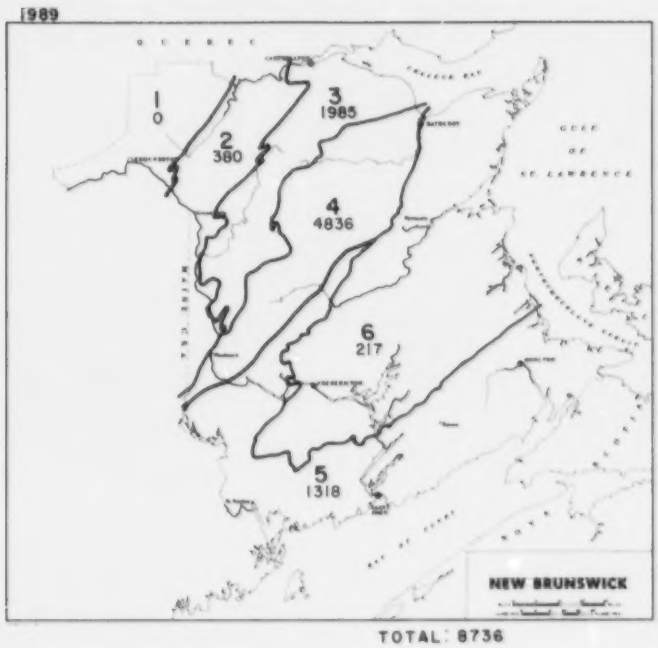

Figure 15. Number of claims staked by metallogenic region in 1989.

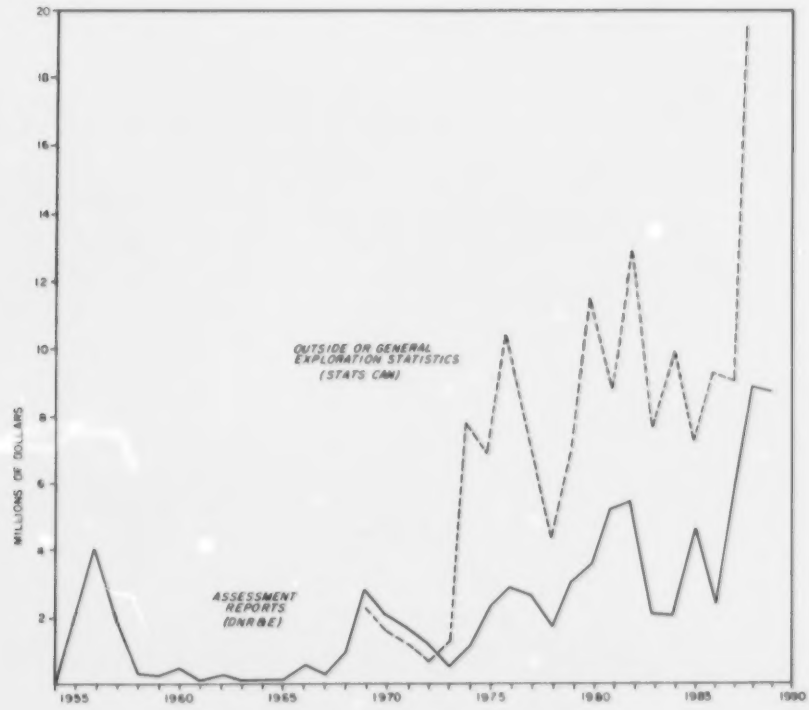

Figure 16. Total annual expenditures reported for assessment credit, 1954-1989. (Values have not been adjusted to account for inflation.)

TABLE 1. MINERAL LANDS AND EXPLORATION STATISTICS, 1989

MINERAL LANDS (total in effect at year's end unless specified for 1989)	No.	Claim Equivalent	Hectares	% Inc. Over Prev. Year* (Decrease)
Prospecting Licences	733	-	-	13
Claims Recorded, 1989	8 736	-	139 776	26
Claims Renewed, 1989	12 598	-	201 568	53
Claims Expired, 1989	2 863	-	45 808	56
Claims in Effect	21 334	-	341 344	34
Coal Agreements	6	5 789	92 624	N/A
Other Agreements	2	226	3 616	-
Potash Leases	3	2 382	38 108	0
Other Leases	15	927	14 832	33
Total Claims and Claim Equivalents	-	30 658	490 524	15
Oil-Gas Licences	2	-	66 072	0
Oil-Gas Leases	4	-	13 289	0
Bituminous Shale Licences	-	-	-	-
Bituminous Shale Development Permits	-	-	-	-
Bituminous Shale Leases	1	-	1 439	0
Underground Storage Licences	-	-	-	-
Underground Storage Leases	-	-	-	-
Quarry Permits	366	-	-	0
Quarry Leases	7	-	481.27	0
Peat Licences (issued 1989)	0	-	-	-
Peat Licences	4	-	1 767	50.5
Peat Leases	27	-	10 841	2.5

EXPLORATION	Number	Length (m)	Value ($)
Assessment Reports	163		8 348 013
Drilling	324 holes	54 742	3 006 733
Potash Exploration Expenditure			-
Drilling	-	-	-
Oil-Gas Exploration Expenditure			-
Drilling	-	-	-
Bituminous Shale Expenditure			-

* Based on number of hectares, where applicable.

The Mine Assessor is responsible for the administration of various Acts as they relate to the collection of taxes and royalties due the Province, and is required to provide estimates for Central Government regarding the amount of revenue expected from each source. The Acts involved are: Metallic Minerals Tax Act, Mining Act, Quarriable Substances Act, Oil and Natural Gas Act.

The metal mines subject to the Metallic Minerals Tax Act are required to make monthly payments, based on an estimate of amount owing, and submit an annual tax return within six months of their year end. These annual returns are audited and additional assessments are issued as required. On-site audits as well as desk audits are conducted on companies subject to the Metallic Minerals Tax Act to determine compliance with the Act.

On-site audits are also conducted on producers of other commodities to determine compliance of the appropriate acts.

Royalties are collected as follows: Monthly - coal, natural gas; Quarterly - potash, salt, oil; Semi-annually - peat moss, sand and gravel.

An annual conference is held for the Provincial Mine Assessors and Revenue Collectors to discuss matter of mutual concern associated with mineral taxation and collection.

MINING COMMISSIONER'S REPORT

M. Richard N. Renouf (P.O. Box 7, Florenceville, N.B. E0J 1K0; Telephone No.: 392-5506) commenced as Mining Commissioner on June 9, 1988.

Decisions were rendered in 1989 with respect to two applications made to the Mining Commissioner in 1988. In 1989, three new applications were made to the Mining Commissioner. A decision has been rendered in one of the applications whereas the remaining two are still in process.

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MP 89-292
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CHAPTER 2. MINERAL EXPLORATION IN NEW BRUNSWICK

METALLIC MINERALS

SUMMARY OF EXPLORATION ACTIVITY Base metals (zinc, lead and copper) were the focus of exploration activity in northern New Brunswick during 1989, largely in the Bathurst-Newcastle district (Figure 17). Of 8736 claims recorded in the province, 7450 were in northern New Brunswick (Figure 15). Since 1956, the average number of claims recorded per year has been about 4500.

Although more claims than average were staked in northern New Brunswick in 1989, there were only about a dozen companies doing mineral exploration in the area. The total amount of money spent was approximately $12 000 000.

Noranda Exploration Company, Limited spent about $7 500 000, mainly in the Heath Steele-Stratmat-Halfmile Lake (HSH) area, about 50 km northwest of Newcastle. Four diamond drills worked continuously all summer and fall at Stratmat to delineate the eastern extension of the base-metal orebody. In February, Noranda and Brunswick Mining and Smelting Corporation Limited announced that the Heath Steele mill would re-open to process ore from Stratmat and vicinity. Exploration conducted on at least ten properties in the surrounding area included geological mapping, geochemistry, geophysics, and trenching. Drilling was carried out on five other properties outside the HSH area.

Falconbridge Limited staked approximately 1400 claims during the first quarter of the year in the Nash Creek-Jacquet River area, which is in the Siluro-Devonian volcanic belt north of Bathurst. An airborne Dighem survey was flown over the claim block in the spring. Some additional claims were optioned from prospectors during the summer. Preliminary exploration was conducted over much of the ground and a drilling programme (7000 m) was completed at the Nash Creek base-metal occurrences that are adjacent to the north-south trending Jacquet River Fault.

NovaGold Resources Inc. constructed a vat-leach mill at its Murray Brook deposit and began production in early September. The first 18 000 t of gossan yielded 1510 t of precipitate containing 23 700 g/t gold and 180 000 g/t silver. This gave an accumulated head grade of 1.37 g/t gold and 48 g/t silver with recovery rates of 87.7% and 19.1%, respectively. By year's end, 111 970 g of gold and 933.1 kg of silver had been produced. In addition, a definition drilling programme (over 1600 m) was conducted in late winter to test the copper zone beneath the gossan. A proven reserve of 298 500 t grading 4.68% copper was outlined, and plans were made to mine this zone once the gossan has been removed.

Stratabound Minerals Corp. constructed a road to its Captain North Extension (CNE) base-metal deposit. The area for the open-pit was cleared, partly excavated, and tested by shallow drilling in preparation for bulk

sampling. The excavation revealed structures and stratigraphic relationships that prompted further drilling on the deposit to find its continuation to the south. As a result, proven reserves are 432 432 t grading 5.28% zinc, 1.94% lead, and 57.54 g/t silver.

Brunswick Mining and Smelting Corporation Limited intersected 13.4 m of massive sulphides 1100 m below surface at a location about 2 km north of the No. 12 shaft. This included 8.5 m grading 4.61% lead, 9.91% zinc, 0.22% copper, 183.4 g/t silver and 1.65 g/t gold. The discovery was made based upon predictive geology, rather than geochemistry or geophysics, and is the first deep base-metal discovery to be made in the Bathurst - Newcastle district. Brunswick also discovered an interesting stibnite showing on its Caribou Road property, about 16 km west of the No. 12 shaft. Four trenches intersected stibnite mineralization with the best channel assays being 5.1% antimony over 1.1 m and 5.6% antimony over 0.4 m. Although drill core assays yielded up to 13.6% antimony over 0.3 m, 11 drill holes showed that the mineralized zone is subeconomic.

Acadia Mineral Ventures Limited staked more than 1000 claims in the Bathurst camp during the first quarter of 1989. Subsequently, Acadia acquired control of Guinness Gold Resources Limited and transferred a large number of these claims to that company. Others were transferred to Westminer Canada Limited. Both companies started preliminary exploration programmes on their claims at the beginning of July. Acadia subsequently sold its interest in Guinness Gold to a management group headed by Mr. William Burton of Atlantic Goldfields Inc. and closed its office in Bathurst.

Corona Corporation, one of the few companies not exploring for base metals, did further trenching on its Rocky Brook precious metal property in the Siluro-Devonian volcanic belt. As a result, northwesterly trending mineralized structures were found in areas that had not been tested in the initial drilling programme. Trenching was done on a new zone at Corona's California Lake silver property and on soil anomalies east of the company's Elmtree (Alcida) gold deposit.

Several other companies were also active in northern New Brunswick during 1989. Granges Exploration Ltd. drilled four holes on its Clearwater base-metal property and ten holes on its Maliseet Mountain Cu-Ni property. Rio Algom Exploration Incorporated conducted geological mapping and geophysical surveys on its Nepisiguit Brook property, located immediately north of the Captain North Extension (CNE) deposit. Aurtec Incorporated trenched and drilled near Madran, north of Bathurst. Sharpe Energy and Resources Limited drilled two holes to test a gravity anomaly beneath Carboniferous cover near Bruce Siding, south of Bathurst. Heron Mines Limited showed its Turgeon copper deposit near Belledune to a number of potential joint-venture partners.

Gold exploration remained active in the Caledonia Zone, southeast of the City of Saint John. Mispec Resources Inc. announced favourable results from its drilling programme in the Cape Spencer-Millican Lake area, which led to an option agreement on the property with Hecla Mining Company of Canada Ltd. This major gold mining company also optioned the Kam Creed

(formerly Cuvier Mines Inc.) property farther northeast in this gold-bearing zone. Neptune Resources Corp. intersected ore grade gold over 1 m in a diamond-drill hole in its property 17 km northeast of the Saint John airport. Kenora Gold Occurrences Inc. found a new copper-gold occurrence in the Vernon mine area, in the Fundy Coastal Zone, west of Fundy National Park. Other companies actively exploring for gold in the Caledonia Zone include Corona Corporation, Maritime Resource Research Ltd. and several prospectors.

Interest in platinum and paladium exploration in areas underlain by Precambrian layered mafic-ultramafic intrusions in the Caledonia Zone also increased. Noranda Exploration Company, Limited optioned the Mechanic Settlement platinum-paladium prospect from PGE Resource Corp. and Corona Corporation, and Falconbridge Limited staked a large claim group with potential for platinum group elements farther to the northeast.

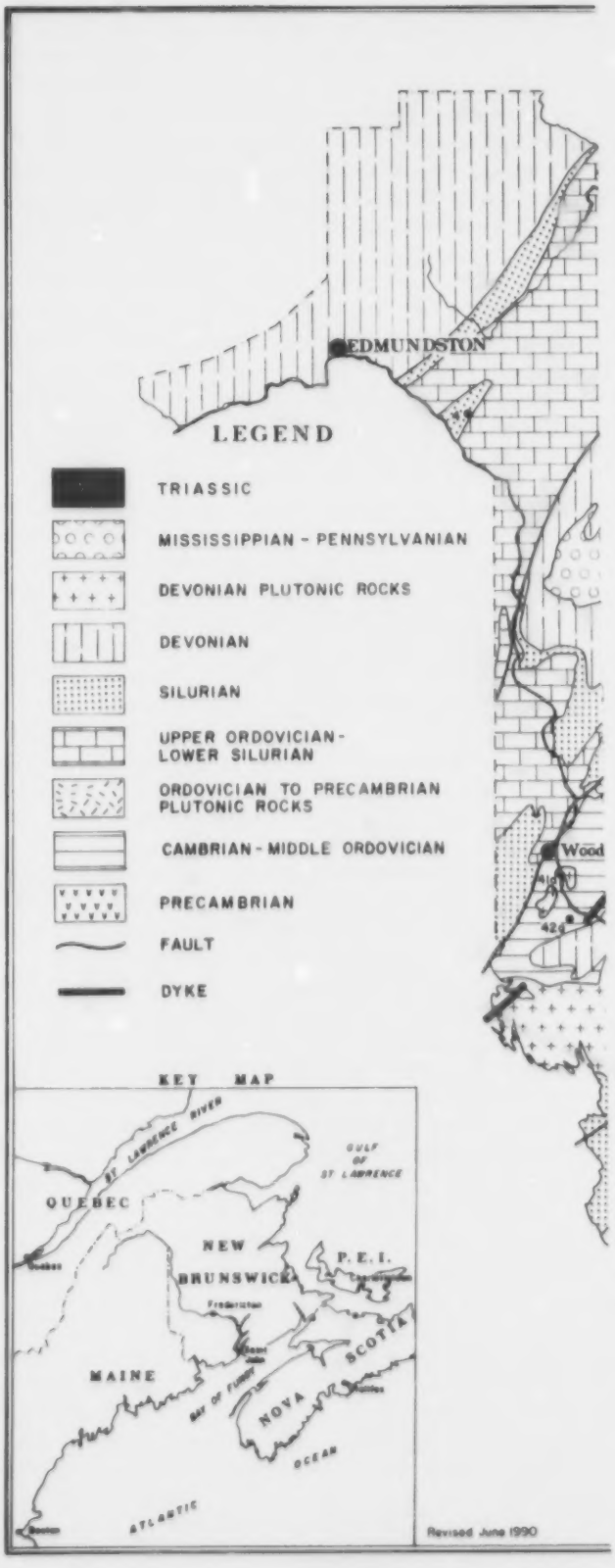
Gold exploration was greatly accelerated in the St. Croix Zone. Inco Gold Company continued exploration on the former LAC Minerals property at Annidale, where one diamond-drill hole intersected economically interesting amounts of gold over 1.5 m. BP Resources Canada Limited explored the Stewarton claim group, where gold was found in angular float and soils. Grand Empire Exploration Limited continued examination of the Sand Brook Mountain prospect where ore-grade gold was discovered. Goldfluor Exploration Limited delineated a gold-bearing zone of economic interest at Jimmy Hill. Other companies active in the St. Croix Zone include PGE Resource Corp., Brunswick Mining and Smelting Corporation Limited, Maritime Resource Research Ltd., and Cobrun Mining Corporation.

Gold exploration was also re-activated in the Mascarene Zone. Costigan Gold Corporation commenced exploration on the Evandale copper-gold prospect, where several ore-grade gold-bearing veins were intersected by diamond drilling. BP Resources found auriferous material while prospecting and sampling the Taylor Brook prospect. Other companies exploring in this area included Corona Corporation, PGE Resource Corp., Cobrun Mining Corporation and Lombard Consolidated Resources Inc.

Renewed interest in tin was indicated by the option of the Mount Pleasant deposit by NovaGold Resources Inc. The company conducted an exploration programme in the Saddle Zone between the North and Fire Tower deposits, which led to the discovery of a new tin deposit. The company also staked some of the better tin occurrences west of Mount Pleasant.

LEGEND FOR FIGURE 17

1. Brunswick Mining and Smelting Corporation Limited
2. Wayne Carroll
3. Peter Jamieson
4. Joseph P. Fahey
5. BP Resources Canada Limited
6. Norman Pitre
7. NovaGold Resources Inc.
8. Owen Hickey
9. Rio Algom Exploration Incorporated
10. Northeast Exploration Services Limited
11. Sharpe Energy and Resources Limited
12. Peter Dimmell
13. Falconbridge Limited
14. Lacana Mining Corporation Limited
15. Marshall Minerals Corp.
16. Orville O'Connell
17. Connie Willett
18. Placer Dome Incorporated
19. LAC Minerals Limited
20. Heron Mines Limited
21. Fred Cady
22. Michael McCombe
23. Aurtec Incorporated
24. Shamrock Resources Inc.
25. Acadia Mineral Ventures Limited
26. East West Caribou Mining Limited
27. Sevogle Exploration Inc.
28. Claude A. Willett
29. Donald C. Graham
30. Ian A. Graham
31. John A. Duffy
32. Key Anacon Mines Limited
33. L. Paul Zed
34. Mattagami Lake Exploration Limited
35. Thomas Jamieson and John Duffy
36. Noranda Exploration Company, Limited
37. Kenneth D.A. Whaley
38. Granges Exploration Ltd.
39. Arnold Somers
40. Robert J. Connor
41. Maritime Resource Research Ltd.
42. Derek F. Brown
43. Dominion Explorers Inc.
44. PGE Resource Corp.
45. Edgar Brown
46. William E. Carter
47. Grand Empire Exploration Limited
48. Peter Fenety and Roy McIntyre
49. Goldfluor Exploration Limited
50. Cobrun Mining Corporation
51. James Kelly
52. Lombard Consolidated Resources Inc.
53. Costigan Gold Corporation
54. Morton Gordon
55. Kinbauri Gold Corp.
56. William G. Walton
57. J.A. Roy McIntyre
58. Glenvet Resources Limited
59. Robert Baxter
60. Neptune Resources Corp.
61. Hispec Resources Inc.
62. Kenora Gold Occurrences Inc.
63. PGE Resource Corp. and Corona Corporation
64. SKW Canada Inc.
65. James Colucci
66. Lafarge Canada Inc.
67. Dickenson Mines Ltd.
68. Atlantic Orebodies Inc.
69. Cecil Smyth



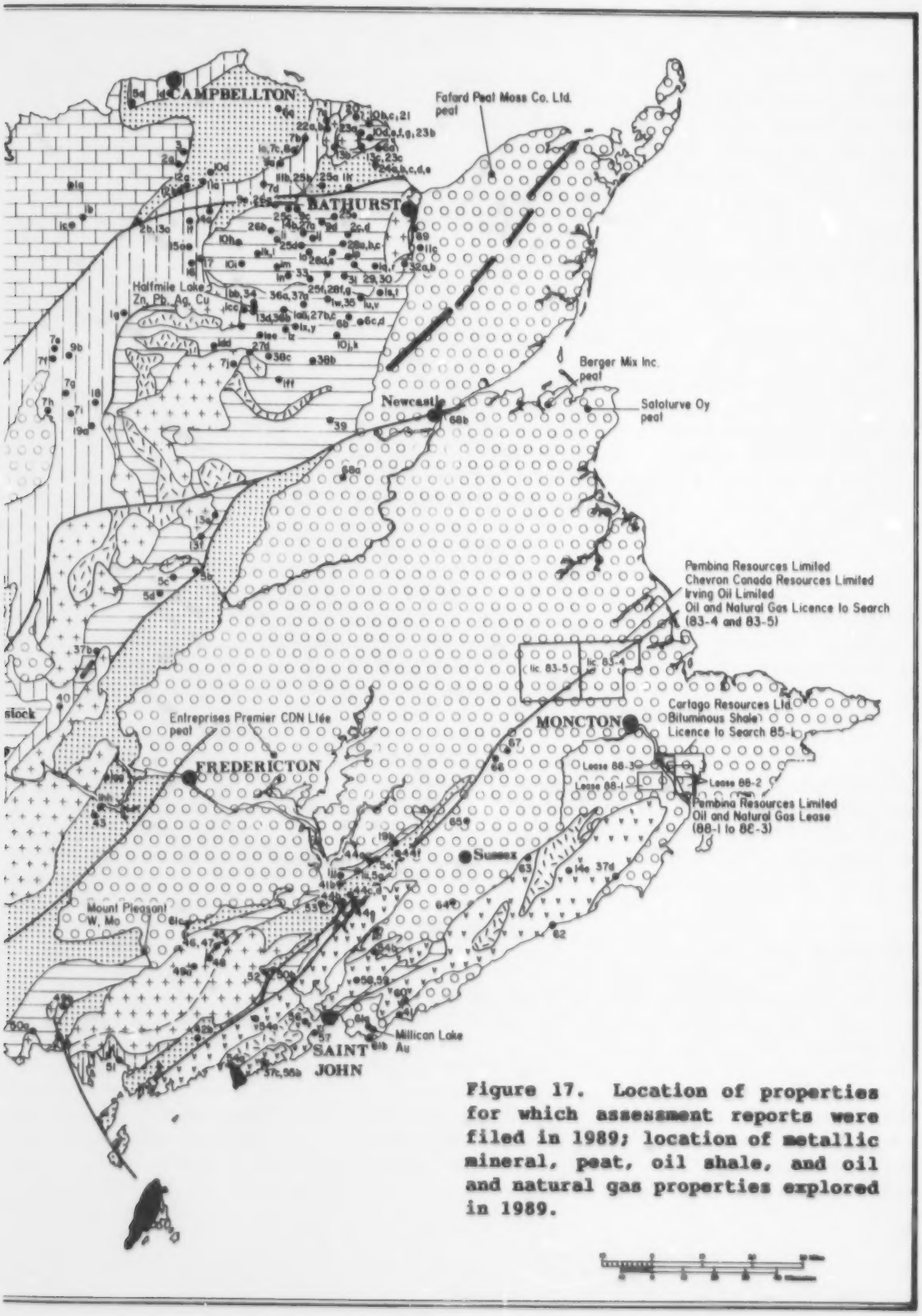


Figure 17. Location of properties for which assessment reports were filed in 1989; location of metallic mineral, peat, oil shale, and oil and natural gas properties explored in 1989.

EDITOR'S NOTE: The first name (company or individual) given for each assessment report is that of the holder of the mining rights. Since the author of the report may not be the holder of the rights, please consult the GEOSCAN index for cross-reference information. The GEOSCAN reference number follows the claim group name.

MATAPEDIA-AROOSTOOK ZONE

1. Brunswick Mining and Smelting Corporation Limited

(a) McCORMACK/RAMSAY BROOK Claim Gp. (473749) 21 O/11E

Confidential until September 29, 1991. This group of 194 claims is located approximately 70 km west of Bathurst. A 7.5 km grid was established and geological mapping and prospecting were carried out. A total of 1083 soil samples were analysed for Au and As. VLF EM and magnetometer surveys, 6 trenches (totalling 350 m), and 6 diamond-drill holes (totalling 661.49 m) were completed.

(b) 27-MILE BROOK Claim Gp. (473672) 21 O/11E

This 19-claim group is located approximately 21 km east of Kedgwick. Work consisted of general prospecting, soil geochemistry (399 samples), and proton magnetometer and VLF surveys. B-horizon soils contained up to 57 ppm Cu, 40 ppm Pb, 236 ppm Zn, 27 ppm As, 0.5 ppm Ag, 7.4 ppm Sb, and 15 ppb Au. Several weak geophysical anomalies were delineated. No further work is planned.

(c) 30-MILE BROOK Claim Gp. (473673) 21 O/11E

Confidential until April 19, 1991. This 25-claim group is located approximately 20 km east-southeast of Kedgwick. Work consisted of linecutting (11.1 km), VLF and proton magnetometer surveys, and rock and soil geochemistry. A total of 445 B-horizon soil samples were collected and analysed for Cu, Pb, Zn, As, Ag, Au, and Sb.

2. Wayne Carroll

(a) CARROLL (POPELOGAN) Claim Gp. (473719) 21 O/10E

This 8-claim group is located approximately 73 km west-northwest of Bathurst. The area is underlain by sedimentary rocks of the Ordovician-Silurian Matapédia Group and Ordovician Grog Brook Group as well as mafic volcanics of the Ordovician Goulette Brook Formation. Work consisted of general prospecting, rock geochemistry (15 samples), and a soil geochemical survey (365 samples). Multi-element analyses, including Au, on rock and soil samples outlined several anomalies. Further geochemistry was recommended.

3. **Peter Jamieson**

POPELOGAN Claim Gp. (473778) 21 O/15E

This 10-claim group is located approximately 70 km west-northwest of Bathurst. The property contains stratiform, skarn-type copper mineralization. Work consisted of salvaging core left at the site and assaying sections of the core for Au, Cu, Zn, As, Mo, Pd, Ag, Sb, Pt, Hg, Pb, and Bi. Results did not indicate potential for Au in the sections that were analysed. However, the main copper zones were not analysed because those sections of core were missing.

4. **Joseph P. Fahey**

ST. LEONARD Fe/Mn Claim Gp. (473741) 21 O/4W

This 20-claim group is located 6 km northeast of St. Leonard. Geochemical analyses and metallurgical testing were carried out.

TOBIQUE - CHALEUR ZONE

1. **Brunswick Mining and Smelting Corporation Limited**

(d) VAL D'AMOUR Claim Gp. (473709) 21 O/15E

Confidential until June 20, 1991. This block of 16 claims, which lies about 5 km south of Campbellton, was staked as a result of a Geological Survey of Canada regional till survey. Work consisted of a detailed till study and prospecting.

(e) WILDCAT BROOK Claim Gp. (473609) 21 O/16E

Confidential until January 12, 1991. This 16-claim group is located approximately 20 km southwest of the village of Durham. General prospecting was completed. A total of 48 B-horizon soil, 20 stream-silt, and 40 rock samples were collected and analysed for Cu, Pb, Zn, As, Sb, Ag, and Au. Twenty heavy-mineral concentrates were analysed for Au.

(f) RITCHIE BROOK Claim Gp. (473664) 21 O/11E

Confidential until April 6, 1991. This group of 12 claims is located approximately 18 km east of Kedgwick. General prospecting and an IP geophysical survey were completed. A total of 71 soil samples were analysed for Cu, Pb, Zn, As, Ag, Sb, and Au. Seven rock samples were analysed for Au and Sb.

(g) FOUR MILE BROOK Claim Gp. (473618) 21 O/7W

Confidential until January 25, 1991. This group of 60 claims is located 9 km south of Mount Carleton Park. Work included collection and analysis of 590 geochemical samples (heavy-mineral concentrate, soil, silt, and rock).

2. Wayne Carroll

(b) 10 MILE POOL Claim Gp. (473612) 21 O/10W

This 4-claim group is located approximately 80 km west of Bathurst. The claims were staked in response to till geochemistry data released by the Geological Surveys Branch. The area is underlain by Ordovician and Silurian calcareous sediments; felsic and mafic dykes and sills intrude the sediments. General prospecting and a soil geochemical survey were carried out. One hundred and twenty-eight C-horizon soils were analysed for 28 elements by ICP.

5. BP Resources Canada Limited

(a) FELIX GULCH Claim Gp. (473636) 21 O/15W

This group of 20 claims is located approximately 16 km southwest of Campbellton. The property is underlain by Silurian sedimentary rocks in fault contact with Devonian sedimentary and mafic volcanic rocks. Work consisted of general prospecting and a geochemical survey (62 samples). Thirty-one B- and C-horizon samples were analysed for 32 elements as a follow-up to a till geochemical survey released by the Geological Surveys Branch. Only minor anomalous Hg values were obtained. The original anomaly, 500 m east of the claim group, was not sampled.

6. Norman Pitre

(a) BENJAMIN RIVER Claim Gp. (473619) 21 O/16E

This 27-claim group is located 65 km northwest of Bathurst by road. The area is underlain by felsic volcanics of the Silurian Chaleurs Group, as well as mafic and felsic intrusive rocks. Work consisted of general prospecting and a soil geochemical survey. A total of 135 samples were analysed for 28 elements by ICP and for Au by fire assay. Several anomalous but erratic values were obtained (up to 40 ppb Au). Further geochemical and geophysical surveys are recommended.

7. NovaGold Resources Inc.

(a) MacGREGOR Claim Gp. (473763) 21 O/16E

Confidential until November 1, 1991. This 4-claim group is located approximately 5 km south of the village of Jacquet River. General prospecting and geological mapping were carried out. Of the 18 rock samples collected, 5 were sent for analysis (41 elements).

(b) JACQUET RIVER Claim Gp. (473660) 21 O/16E

Confidential until April 3, 1991. This group of 153 claims is located approximately 15 km south-southwest of the village of Jacquet River. General prospecting and geological mapping were completed. A total of 65 rock and 108 silt samples were collected and analysed for 33 and 28 elements, respectively. Fourteen heavy-mineral concentrate samples were analysed for 28 elements.

(c) FALLS GULCH Claim Gp. (473637) 21 O/16E

Confidential until February 27, 1991. This block of 20 claims lies on the north side of the Jacquet River and 15 km south-southwest of the village of Jacquet River. Work included linecutting, magnetometer and VLF surveys, and geochemistry. A total of 936 soil samples were collected and analysed for 32 elements.

(d) ROCKY GULCH Claim Gp. (473679) 21 O/9W

Confidential until April 30, 1991. This 48-claim group is located approximately 50 km west of Beresford. General prospecting and geological mapping were carried out. A total of 25 stream silt, 12 heavy-mineral concentrate, and 21 rock samples were collected and analysed for 28, 28, and 33 elements, respectively.

(e) RILEY BROOK Claim Gp. (473710) 21 O/3E

Confidential until June 26, 1991. This 288-claim group is located immediately northeast of the village of Riley Brook. General prospecting and geological mapping were carried out. A total of 344 silt, 110 heavy-mineral concentrate, and 192 rock samples were collected and analysed for 28, 28, and 41 elements, respectively.

(f) RILEY BROOK Claim Gp. (473770) 21 O/3E

Confidential until November 14, 1991. This group of 32 claims is located 2 km east of the village of Riley Brook. Work consisted of linecutting (19.9 km), general prospecting, geologic mapping, magnetometer and VLF EM surveys, and a soil geochemical survey. A total of 552 B-horizon soil and 20 rock samples were collected and analysed for 35 and 41 elements, respectively.

(g) BLUE MOUNTAIN BROOK Claim Gp. (473671) 21 O/3E

Confidential until April 16, 1991. This 84-claim group is located approximately 10.5 km southeast of the village of Riley Brook. General prospecting and geological mapping were completed. A total of 16 rock and 12 silt samples were analysed for 33 and 30 elements, respectively. Eight heavy-mineral concentrate samples were analysed for gold.

(h) CRAIG MOUNTAIN Claim Gp. (473683) 21 O/3E

Confidential until May 5, 1991. This group consists of 266 claims situated approximately 20 km south of the village of Riley Brook. General prospecting and geological mapping were carried out. A total of 160 silt, 72 heavy-mineral concentrate, and 56 rock samples were collected and analysed for 30, 14, and 33 elements, respectively.

(i) SEWELL BROOK Claim Gp. (473771) 21 O/3E

Confidential until November 14, 1991. This 16-claim group is located 11 km west of Trousers Lake. Work consisted of linecutting (5.3 km), general prospecting, geological mapping, total field magnetic and VLF EM surveys, rock geochemistry (17 samples), and a soil geochemical survey (552 samples). A total of 163 B-horizon soil and 17 rock samples were analysed for 35 and 41 elements, respectively.

8. Owen Hickey

RAMSAY BROOK Claim Gp. (473702) 21 O/16E

This 12-claim group is located 15 km south-southwest of the village of Jacquet River. The group was staked as a result of a lithogeochemical study released by the Geological Surveys Branch. The area is underlain by volcanic and sedimentary rocks of the Lower Devonian Dalhousie Group. Work consisted of general prospecting and excavation of four trenches (totalling 10 m) to examine a sulphide showing in Lead Gulch and a manganese showing on the property. One assay yielded 41.25% Mn, 2100 ppm As, 70 ppm Sb, and 0.9 ppm Ag. Au was not detected. It was recommended that the property be held for another year.

9. Rio Algom Exploration Incorporated

(a) McNEILL Claim Gp. (473658) 21 O/9E, 16E

Confidential until April 2, 1991. This 139-claim group is located approximately 40 km west of Bathurst. General prospecting, geological mapping and a gamma-ray spectrometric survey were carried out. A total of 470 rock, till, B-horizon soil, and stream sediment samples were collected and analysed for Au, Cu, Pb, Zn, Ag, As, Hg, and Sb.

(b) RILEY BROOK Claim Gp. (473772) 21 O/3E

This group of 49 claims is approximately 40 km north of Plaster Rock. The claims were staked as a result of lithogeochemical data released by the Geological Surveys Branch. The group is underlain by mafic volcanic and minor sedimentary rocks of the Devonian Tobique Group. Work consisted of lithologic mapping, evaluation of anomalies, and silt geochemical sampling. Lithogeochemical analysis was done on 16 samples, for Au by fire assay-atomic absorption and for Cu, Pb, Zn, Mo, Cd, As, Se, Mg, Sb, Bi, and Ag by atomic absorption. The highest value found for Au was 110 ppb; anomalous Pb, Zn, and Cu values from sulphide mineralization in vein-filled fracture zones were not considered significant. The -80 mesh fraction of 30 silt samples was analysed using 32-element total digestion ICP. As a result of unfavourable results, no further exploration for gold is planned.

10. Northeast Exploration Services Limited

(a) MIDDLE BROOK Claim Gp. (473715) 21 O/10E

Confidential until July 21, 1991. This 80-claim group is located approximately 40 km west of Beresford. Work consisted of general prospecting, geologic mapping, and geochemical analysis of 87 silt and 33 rock samples for 35 and 41 elements, respectively.

11. Sharpe Energy and Resources Limited

(a) AKROYD LAKE Claim Gp. (473682) 21 O/10E

This 34-claim group is located approximately 70 km west of Bathurst. The property was staked on the basis of geology maps released by the Geological Surveys Branch and on radiometric maps released by the Geological Survey of Canada. The area is underlain by felsic and mafic

volcanic and sedimentary rocks of the Silurian Chaleurs Group. Work consisted of linecutting (51 km), general prospecting, and a soil geochemical survey (1479 samples). B-horizon soil samples, analysed for Au by atomic absorption, contained up to 30 ppb Au. Further geochemistry, prospecting, and mapping are recommended.

12. Peter Dimmell

(a) SOUTHEAST UPSALQUITCH Claim Gp. (473706) 21 O/10E

This 9-claim group is located 65 km west of Bathurst via Route 180 and the NBIP haulage road. The area is underlain by generally northeast-striking Silurian-Devonian felsic volcanic, mafic volcanic, and metasedimentary rocks. Work consisted of linecutting and soil sampling (74 samples analysed for 28 elements). Based on anomalous arsenic values, geophysics and further geochemical sampling is recommended.

(b) CARIBOU BROOK Claim Gp. (473666) 21 O/10E

This 4-claim group is located 80 km west of Bathurst and 4 km east of Upsalquitch Forks. The area is underlain by Silurian-Devonian sedimentary and volcanic rocks that are intruded by small mafic dykes and sills. Work consisted of linecutting (6.5 km), soil geochemistry (197 samples), and a VLF EM-16 survey. B-horizon soils, analysed for 28 elements by ICP and for gold by atomic absorption, contained up to 25 ppb Au, 6.4 ppm Ag, 264 ppm As, 133 ppm Cu, 1025 ppm Pb, and 1654 ppm Zn. Several weak conductors were delineated. Till sampling was recommended.

13. Falconbridge Limited

(a) NINE MILE BROOK Claim Gp. (473730) 21 O/10W

Confidential until September 1, 1991. This group is located about 3 km southwest of Ten Mile Pool on the Northwest Upsalquitch River. Work consisted of geologic mapping and sampling (7 rock and 14 stream-sediment samples were collected and analysed for 10 and 34 elements, respectively).

14. Lacana Mining Corporation Limited

(a) McCORMACK BROOK Claim Gp. (473657) 21 O/10E

This 12-claim group is situated approximately 65 km west of Bathurst. The area is underlain by Silurian-Devonian sedimentary and mafic volcanic rocks intruded by diabasic-gabbroic sills. Work consisted of linecutting (9.7 km), and proton magnetometer and VLF surveys. Of the six weak conductors delineated, three are associated with or are near weak magnetic anomalies. Soil or till sampling was recommended.

15. Marshall Minerals Corp.

(a) RESTIGOUCHE DEPOSIT Claim Gp. (473699) 21 O/7E

Confidential until June 9, 1991. This property is located approximately 65 km west of Bathurst. A total of 645 km of airborne geophysical surveys (magnetometer and VLF) were completed.

16. Orville O'Connell

O'CON. WEST Claim Gp. (473776) 21 O/7E

This 20-claim group is located approximately 70 km west-southwest of Bathurst and 3 km south of First Portage Lake. Work consisted of grid establishment (9.0 km), general prospecting, and trenching (totalling 5 m). A total of 403 rock specimens and 19 silt samples were collected. Soil samples were collected from 3 trenches. Geochemical results are forthcoming.

17. Connie Willett

RANSON BROOK Claim Gp. (473724) 21 O/7E

This 2-claim group is situated approximately 65 km west-southwest of Bathurst and 2 km southeast of First Portage Lake. Work consisted of line installation (1.9 km), a VLF survey, soil sample collection, and data preparation-interpretation. Two conductive zones were delineated and soil analyses are pending.

18. Placer Dome Incorporated

SHINGLE GULCH Claim Gp., Project 388 (473781) 21 O/3E

The Shingle Gulch claim group consists of 68 claims and is approximately 15 km southeast of Riley Brook. The area is underlain by interbedded and intercalated sedimentary and mafic to felsic volcanic rocks of the Lower Devonian Tobique Group. Work consisted of linecutting (101 km), and proton magnetometer, VLF, and Max-Min II surveys. The geophysical results show a dominantly north-northeast-trending strike with cross-trends that result from mafic intrusions and/or faults. Geological mapping and compilation of previous work are recommended.

19. LAC Minerals Limited

MOUNT COSTIGAN Claim Gp. (473621) 21 J/14E

This 30-claim group covers Mount Costigan in Victoria County. Work on the property consisted of splitting and analysis of samples for Cu, Pb, Zn, As, Au, and Ag. The highest values obtained were 0.56% Cu, 0.25% Pb, 0.39% Zn, <0.10% As, 1.22 g/t Au, and 11.1 g/t Ag.

ELMTREE ZONE

1. Brunswick Mining and Smelting Corporation Limited

(h) MILLSTREAM GOLD Claim Gp. (473613) 21 P/12W

Confidential until January 19, 1991. This is a 43-claim group located between Sormany and Nicholas Denys, 14 km northwest of Bathurst. Work consisted of diamond-drilling (2 holes), sample collection (1833 soil samples analysed for Cu, Pb, Zn, As, Ag, Sb, and Au), and magnetometer and VLF surveys.

6. **Norman Pitre**

(d) ELMTREE Claim Gp. (473687) 21 P/13W

This is a 22-claim group located 20 km northwest of Bathurst and is bisected by Highway 11. Prospecting and a magnetic survey were carried out on the grid. Thirty-three heavy-mineral concentrate samples were taken in the Little Elmtree watershed and 81 soil samples were collected over a magnetic anomaly and analysed for 28 elements. No anomalous values were obtained. Further work has been recommended for the group including soil sampling and VLF surveying.

10. **Northeast Exploration Services Limited**

(b) GUITARD BROOK EAST Claim Gp. (473623) 21 P/13W

Confidential until February 5, 1991. This is an 11-claim group located 25 km northwest of Bathurst. Work included installation of a grid and the collection of 146 soil samples from the Bf-horizon and analysis for 28 elements.

(c) GUITARD BROOK Claim Gp. (473624) 21 P/13W

Confidential until February 5, 1991. The 9-claim group is located 25 km northwest of Bathurst and is transected by Route 11. Work consisted of geological mapping and soil sampling (140 soil samples analysed for 28 elements).

(d) ELMTREE Claim Gp. (473787) 21 P/13W

Confidential until December 12, 1991. This 7-claim group is located approximately 25 km north of Bathurst. Work included diamond-drilling (7 holes), trenching (2) and analysis of core samples for Cu, Pb, Zn, Au, and Ag.

(e) ELMTREE Claim Gp. (473634) 21 P/13W

This group of 7 claims is approximately 3 km west of Madran. Work included the collection of 21 soil samples by overburden drilling. The most anomalous sample showed 3695 ppm Pb and 10 957 ppm Zn. Geophysical surveys (VLF and proton mangnetometer) outlined anomalous targets. Follow-up work has been recommended and will include work on the VLF targets.

(f) ELMTREE EAST Claim Gp. (473705) 21 P/13W

This is a group of 3 claims located about 10 km south of the Brunswick Mining and Smelting Corporation Limited smelter at Belldune. The group is underlain by Ordovician metasedimentary rocks. Work consisted of soil sampling to examine the potential of a mineralized vein. Values up to 604 ppm Pb, 630 ppm Zn, and anomalous Au have been shown. An expanded geochemical survey is recommended for the group.

(g) ELMTREE WEST Claim Gp. (473703) 21 P/13W

This is a 7-claim group located 25 km north of Bathurst and 4 km west of Madran. The group is underlain by Ordovician metasedimentary rocks. Work included surveying by VLF, magnetometer, and gradient magnetometer. Several conductive and magnetic zones were outlined. Follow-up work has been suggested for areas of known mineralization.

13. **Falconbridge Limited**

(b) ANTINOURI LAKE Claim Gp. (473765) 21 P/13W

Confidential until November 3, 1991. This 4-claim group is located on the southwest shore of Antinouri Lake, 32 km northwest of Bathurst and 14 km south of Jacquet River. Work consisted of the collection and analysis of seven rock samples.

(c) HICKEY/CADY OPTION Claim Gp. (473779) 21 P/13W

Confidential until November 29, 1991. This group of 55 contiguous claims is located 20 km northwest of Bathurst and 2 km northwest of Alcida. Work on the property consisted of linecutting, an IP survey, prospecting, and collection and analysis of 10 rock samples.

20. **Heron Mines Limited**

HODGIN Claim Gp. (473744) 21 P/13W

Confidential until September 21, 1991. This 49-claim group is located 34.5 km northwest of Bathurst and 3 km south-southwest of the Brunswick Mining and Smelting Corporation Limited smelter at Belledune. Work consisted of diamond drilling (9 holes).

21. **Fred Cady**

HICKEY/CADY Claim Gp. (473663) 21 P/13W

This is a 9-claim group located 25 km northwest of Bathurst along Highway 11. Work on this property included geological mapping, soil sampling, and VLF and magnetometer surveys. These surveys resulted in the location of several magnetic highs. Several soil anomalies are present. Maximum values are 1118 ppm Cu, 435 ppm Pb, and 1186 ppm Zn. Recommendations include extension of the grid and detailed investigation of areas with coincident VLF and magnetic anomalies.

22. **Michael McCombe**

(a) McMILLAN SETTLEMENT Claim Gp. (473642) 21 O/16E

This 60-claim group is located approximately 54 km northwest of Bathurst by road. The property is underlain by volcanic rocks of the Dalhousie Group. Work consisted of linecutting (1.83 km), soil geochemistry (120 samples), and gravity and magnetometer surveys. Forty soil samples were analysed for Ba, Ag, and Au. Some weak geophysical anomalies were delineated. Diamond drilling is planned as future work.

(b) JACQUET RIVER Claim Gp. (473701) 21 O/16E

This 85-claim group, which contains the McMillan Settlement claim group, is located 54 km northwest of Bathurst by road. Work consisted of two diamond-drill holes (totalling 241.5 m) and petrographic analysis of a core sample. Drilling intersected mainly mafic and felsic volcanics with minor sedimentary rocks and mafic intrusions. Minor amounts of mineralization were also intersected. Further drilling has been recommended.

23. Aurtec Incorporated

(a) WALKER BROOK Claim Gp. (473788) 21 P/13W

Confidential until December 12, 1991. This 12-claim group is located 25 km northwest of Bathurst. Work included a stream-sediment survey followed up by a soil survey in which 229 samples were analysed for 25 elements.

(b) PRAIRIE BROOK Claim Gp. (473762) 21 P/13W

Confidential until November 1, 1991. This 3-claim group is located 25 km north-northwest of Bathurst and is bisected by Highway 11. Work consisted of VLF and proton magnetometer surveys.

(c) ELMTREE RIVER Claim Gp. (473777) 21 P/13W

Confidential until November 1, 1991. The Elmtree River Group comprises 12 claims and is located approximately 26 km north-northeast of Bathurst and 3 km west of Madran. Work consisted of grid installation, and magnetometer and VLF surveys.

24. Shamrock Resources Inc.

(a) NIGADOO MINE Property, M. Lease 239 (473625) 21 P/12W

Confidential until February 5, 1991. This property is located 25 km northwest of Bathurst. Work included installation of a grid, and VLF, and magnetometer surveys, and collection and analysis of 329 soil samples for 28 elements.

(b) NIGADOO MINE Claim Gp. (473626) 21 P/12W

Confidential until February 5, 1991. This is a 12-claim group located east of the Nigadoo mine, 25 km northwest of Bathurst. Work consisted of installing a grid, VLF and magnetometer surveys, and collection and analysis of 849 soil samples for 28 elements.

(c) NIGADOO MINE Property, M. Lease 239 (473696) 21 P/12W

Confidential until June 5, 1991. This mining lease, originally 239 claims, is located 25 km northwest of Bathurst. Work included overburden drilling, VLF, magnetometer, and Max-Min surveys, and collection and analysis of 120 till samples for 28 elements.

(d) NIGADOO MINE Claim Gp. (473697) 21 P/12W

Confidential until June 5, 1991. This group is located about 25 km northwest of Bathurst. Work included overburden drilling, geologic and VLF surveys, and collection and analysis of 29 till samples for 28 elements.

(e) MINE EAST GROUP Claim Gp. (473698) 21 P/12W

Confidential until June 5, 1991. This 12-claim group is located 25 km northwest of Bathurst. Work included overburden sampling (32 samples analysed for 28 elements) and interpretation.

25. **Acadia Mineral Ventures Limited**

(a) MILLSTREAM LAKE and MILLSTREAM WEST JOINT VENTURE Claim Gps. (473628) 21 O/9E

The Millstream Lake group consists of 21 claims and the Millstream West Joint Venture comprises 62 claims. The claim groups are approximately 25 km west of Bathurst. The Rocky Brook-Millstream Fault crosses the centre of the claim groups. This fault separates Ordovician volcanic and sedimentary rocks to the south from Silurian sedimentary rocks to the north. Work consisted of linecutting (63.5 km), a soil geochemical survey (2385 samples), and a magnetic survey. Soil samples, analysed for 28 elements by ICP, outlined several As anomalies commonly with coincident Pb and locally with Ag anomalies. Some magnetic anomalies were also dilineated. Assays in vein-type mineralization often exceed 17 g/t Au. Trenching and/or diamond drilling have been recommended.

MIRAMICHI ZONE

1. **Brunswick Mining and Smelting Corporation Limited**

(i) WOODSIDE BROOK Claim Gp. (473692, 473766) 21 O/9E

The Woodside Brook property consists of 94-claims, approximately 48 km west-southwest of Bathurst and 7 km southeast of the Caribou mine. The property is underlain by quartz-feldspar-eye schist, pyritic chert, felsic volcanics and gabbroic rocks of the Ordovician Tetagouche Group. Work consisted of general prospecting and mapping, linecutting (53.24 km), and geophysical surveys (IP, VLF, proton magnetometer). Several IP, VLF, and magnetic anomalies were delineated. Trenching (7 trenches totalling 600 m) and diamond drilling (8 holes totalling 1317.2 m) were carried out to test geophysical and soil anomalies from the previous year. A large zone of py-Pb-Zn mineralization was found in the trenches; minor py and Au values were obtained from samples collected in the trenches. Major rock types intersected in drilling were rhyolite, chlorite schist, metasediment and gabbro. The best intersection was 1607.0 g/t Ag, 2.02 g/t Au, 750 ppm Sb, 0.48% Pb, 0.60% Zn and 0.12% Cu over 0.9 m. Several other small zones were found. Additional geophysical surveys and diamond drilling were planned.

(j) CARIBOU ROAD Claim Gp. (473691) 21 O/9E

The Caribou Road property consists of 147 claims located approximately 30 km west-southwest of Bathurst. The property straddles a narrow, steeply dipping, sedimentary horizon separating mafic volcanics to the east and felsic volcanics to the west; all are part of the Ordovician Tetagouche Group. Work consisted of detailed soil sampling (920 samples), a gravity survey, and three diamond-drill holes (totalling 767 m). B- and C-horizon soil samples were analysed and contained up to 340 ppm Cu, 520 ppm Pb, 886 ppm Zn, 188 ppm As, 1.77 ppm Ag, 140 ppm Sb, and 41 ppm Au. Anomalous zones were delineated for further work. Drilling intersected mainly sedimentary and minor volcanic rocks with no significant mineralization. Deeper soil samples and trenching are recommended.

(k) PETERS BROOK Claim Gp. (473733) 21 O/8W

Confidential until September 6, 1991. This 20-claim group is located about 50 km southwest of Bathurst and 13 km northwest of California Lake. Work included geological mapping, trenching (4 totalling 565 m), and collection of 52 rock samples and analysis for Cu, Pb, Zn, Ag, and Au.

(l) 44 MILE BROOK Claim Gp. (473685) 21 O/8W

Confidential until May 15, 1991. This 30-claim group is located approximately 52 km southwest of Bathurst. Work consisted of trenching (5 totalling 269 m), and collection of 65 rock samples and analysis for Cu, Pb, Zn, Ag, and Au.

(m) LONG POND Claim Gp. (473767) 21 O/8E

Confidential until November 6, 1991. This is a 35-claim group located 45 km west-southwest of Bathurst in the area of Strachens Lake. The claims were staked as a result of a till survey by New Brunswick Geological Surveys Branch. Work included collection and analysis of 109 soil and 109 till samples.

(n) WEST WEDGE Claim Gp. and ML 1368 (473627) 21 O/8E

Confidenial until February 7, 1991. This is a 49-claim group located approximately 6.5 km west of the Wedge mine. Work on the property included the installation of three separate grids, collection and analysis of 819 soil samples, and geophysical surveys (VLF, HLEM and magnetometer). Trenching was also carried out.

(o) RIO ROAD Claim Gp. (473641) 21 O/8E

The Rio Road property (60 claims) is approximately 35 km west-southwest of Bathurst. Work consisted of prospecting, mapping, lithogeochemistry, and a soil geochemical survey. Lithogeochemical analyses included values up to 123 ppb Au, 32.8 ppm Ag, 619 ppm As, 154 ppm Cu, 23 ppm Mo, 282 ppm Pb, 118 ppm Sb, and 319 ppm Zn. A total of 45 soil samples were analysed for Cu, Pb, Zn, As, Ag, Sb and Au. More work is planned.

(p) PABINEAU WEST Claim Gp. (473764) 21 P/5W

This group of 74 claims is located 64 km southwest of Bathurst and west of the Brunswick No. 12 Grant. Work on this group consisted of VLF and magnetometer surveys. These claims were staked as a result of a Geological Survey of Canada till survey (Open File 1909). Results of the geophysical surveys are pending.

(q) MARITIMES MINING Claim Gp. (473759) 21 P/5W

This is a 22-claim group located 24 km southwest of Bathurst and northeast of the No. 6 Crown Grant. Geophysical surveys carried out on the property include magnetometer, VLF, Max-Min and gravity. Several anomalies were outlined and further work was suggested.

(r) FAB Claim Gp. (473688) 21 P/5W

This is a 43 claim group located 23 km southwest of Bathurst. Work on this property consisted of a down-hole EM survey of diamond-drill holes 218-8 and 218-9, which were drilled in 1986. The survey showed no off-hole anomalies and further drilling is not recommended in the area.

(s) GILMOUR BROOK Claim Gp., Project 217 (473676) 21 P/5W

This is an 89-claim group that lies on the east side of the Nepisiguit River and west of Gilmour Brook. The Taylor Brook road transects the southern end of the group. Work on the property included EM, Max-Min, gravity, and soil-sampling surveys. Although the soil survey did not result in the location of an anomaly, the geophysical surveys did outline some targets. Drilling is recommended at the south end of the grid.

(t) GILMOUR BROOK SOUTH Claim Gp., Project 246 (473731) 21 P/5W

This group of 86 claims is located 25 km southwest of Bathurst and is transected by Gordon Meadow Brook. Work consisted of Max-Min, VLF, and magnetometer surveys. Soils (272 samples) were assayed for base metals and gold pathfinder elements. Some elevated values that correlated with geophysical anomalies were reported. Recommendations for the property include overburden soil sampling and diamond drilling to test geophysical targets.

(u) NEPISIGUIT BROOK Claim Gp. (473646) 21 P/5W

Confidential until March 16, 1991. This group of 60 claims is 48 km southwest of Bathurst and is transected by the Nepisiguit River. Work consisted of one diamond-drill hole and analysis of 15 core samples.

(v) NEPISIGUIT BROOK EXTENSION Claim Gp. (473674) 21 P/5W

Confidential until April 19, 1991. This 11-claim group is located 48 km southwest of Bathurst along the Taylor Brook road, 16.7 km west of its intersection with Highway 360. Work included diamond drilling (1 hole), trenching, and analysis of 48 core samples.

(w) HEATH EAST Claim Gp. (473655) 21 O/8E

Confidential to March 27, 1991. This group of 152 claims lies on the east side of the Heath Steele Mining Lease. Work included geophysical (VLF, HLEM and UTEM-3) and geochemical surveys (107 till samples and 4168 soil samples analysed for Cu, Pb, Zn, As, Ag, and Au).

(x) OTTER BROOK Claim Gp. (473630) 21 O/8E

Confidential until February 9, 1991. This 53-claim group is located approximately 55 km southwest of Bathurst. General prospecting was completed. A total of 48 B-horizon and 48 till (heavy-mineral concentrate) samples were collected and analysed for Cu, Pb, Zn, As, Ag and Au. Till samples were also analysed for Sb.

(y) OTTER BROOK Claim Gp. (473738) 21 O/8E

This 53-claim group is approximately 55 km southwest of Bathurst and 6.4 km west of the Heath Steele mine. The area is underlain by a west-northwest sequence of felsic metavolcanic and metasedimentary rocks believed to be a western extension of the Heath Steele stratigraphy. Work consisted of linecutting (50.08 km) and prospecting. Detailed geophysical surveys were recommended on the cut grid.

(z) FLAHERTY BROOK Claim Gp. (473758) 21 O/8E

Confidential until October 26, 1991. This group of 50 claims is located approximately 12 km southwest of the Heath Steele mine. Work consisted of linecutting (38.95 km); geological mapping and prospecting; rock

geochemistry (11 samples); VLF, magnetic and HLEM surveys; and 10 trenches (totalling 780 km). A total of 1234 soil samples were analysed for Cu, Pb, Zn and Ag and 11 rock samples were analysed for Cu, Pb, Zn, Ag, and Au.

(aa) GRANTS LAKE Claim Gp. (473760) 21 O/8E

Confidential until October 30, 1991. This group of 137 claims is approximately 15 km west-northwest of the Heath Steele mine. Work consisted of geologic mapping, collection and analysis of 1107 soil samples and 8 rock samples, and geophysical surveys (magnetometer, VLF and HLEM).

(bb) MOODY BROOK Claim Gp. (473783) 21 O/8W

Confidential until December 5, 1991. This 63-claim group is located approximately 56 km southwest of Bathurst and 3 km north-northwest of Halfmile Lake. Work consisted of general prospecting, geological mapping, report compilation, collection and analysis of one rock sample, and magnetometer and VLF EM surveys.

(cc) LITTLE BALD MOUNTAIN Claim Gp. (473753) 21 O/8W

Confidential until October 16, 1991. This 101-claim group is located approximately 70 km northwest of Newcastle. A 44 km grid was cut and general prospecting and Max-Min, VLF and magnetometer surveys were carried out. Geological mapping was completed. A total of 1068 B-horizon soil and 74 rock samples were collected and analysed for Cu, Pb, Zn, and Ag. Four trenches totalling 300 m were dug.

(dd) KAGOOT BROOK Claim Gp. (473708) 21 O/2E

Confidential until June 20, 1991. This 17-claim group is located approximately 77 km southwest of Bathurst and 6.5 km northwest of Big Bald Mountain. General prospecting was carried out. A total of 46 rock samples were collected and analysed for Pb, Ag, Sb, Co, and Au.

(ee) KENNY LAKE Claim Gp., Project 4244 (473732) 21 O/1W

Confidential until September 6, 1991. This 37-claim group is about 60 km northwest of Newcastle, between Bear and Kenny lakes. Work consisted of linecutting, geologic mapping, trenching, and geophysical surveys (Max-Min, magnetometer, VLF). In addition, 62 rock samples and 1393 soil samples were collected and analysed for Cu, Pb, Zn, and Ag. Soils were also analysed for Au.

(ff) CHESTER Claim Gp. (473667) 21 O/1E

Confidential until April 13, 1991. This 2-claim group encompasses the Chester mine site, approximately 56 km south of the Heath Steele mine. General prospecting was carried out. Six till and six soil samples were collected and analysed for Cu, Pb, Zn, Ag and Au.

2. Wayne Carroll

(c) CARROLL OPTION Claim Gp. (473800) 21 P/12W

Confidential until December 11, 1991. This 30-claim group is located 22 km west of Bathurst. The group is transected by Little River. Work consisted of linecutting, geologic mapping, soil sampling (1100 samples analysed for Cu, Pb, Zn, Ag, As, and Au), magnetometer and VLF surveys.

(d) KAKALDUCAS Claim Gp. (473785) 21 P/12W

This 10-claim group is located approximately 18 km southwest of Bathurst. The group is north of the Brunwick No. 12 mine and may be on strike with the ore horizon. Magnetometer and VLF geophysical surveys were carried out on the property. These surveys yielded one magnetic anomaly and three VLF anomalies. Five assayed rock samples showed elevated values in Cu, Pb, and Zn. Follow-up work has been recommended for this property.

5. BP Resources Canada Limited

(b) SAND BROOK Claim Gp. (473720) 21 J/10E

This 40-claim group was staked as a result of anomalous values in a stream geochemical survey done in the Sand Brook area by the Geological Surveys Branch. This claim group lies along the Bamford Brook Fault, which separates Ordovician metasedimentary rocks to the west from Silurian sedimentary rocks to the east. Work involved prospecting along Sand Brook and its tributaries and along all roads. A total of 12 rock and float samples were assayed for a suite of 32 elements. Boulders and slate outcrops with small veinlets of quartz-carbonate and minor sulphides are believed to be the sources of the anomaly. No new targets were found and no further work was recommended.

(c) TODD MOUNTAIN Claim Gp. (473717) 21 J/10E

This is a 4-claim group staked as a result of a Geological Surveys Branch geochemical release (June) that showed a gold anomaly. The group is underlain by metasedimentary rocks of the upper Tetagouche Group and encompasses tin occurrences that were outlined by Billiton in 1983-84. As a result of prospecting, two old hand-dug trenches were located. Boulders and outcrop with sulphide mineralization were sampled and analysed for 32 elements. No significant gold enrichment was found but quartz-sulphide veinlets and strong thermal metamorphism may indicate a granite cupola at depth.

(d) HAYDEN BROOK Claim Gp. (473652) 21 J/7E

This 13-claim group is about 12 km south of the western extremity of the Trout Brook Granite in central New Brunswick. The property is underlain by Cambro-Ordovician sedimentary rocks of the Tetagouche Group. The rocks are intensely deformed and a major anticline is well exposed in Hayden Brook. Four base metal sulphide occurrences have been identified on the claim group. The best showing is hosted by a 2.5 m wide diabase dyke. A chip sample across the dyke assayed 2054 ppm Cu, 9252 ppm Pb, 28 606 ppm Zn and 90.6 ppm Ag. The other base metal occurrences are in quartz veins and breccia. Small amounts of As, W, Au, Cd, Bi, and F are also present, which suggests a granitic source. Soil samples were collected at 25 m and 50 m intervals along lines spaced at 200 m intervals. Several well-defined anomalies merit further investigation.

6. Norman Pitre

(b) RAILROAD Claim Gp. (473713) 21 P/5W

Confidential until July 11, 1991. This 9-claim group is situated 10 km east-southeast of Heath Steele mine. Work on the group consisted of linecutting and geophysical surveying using Max-Min and magnetometer.

(c) CAPTAIN DEPOSIT Claim Gp. (473707) 21 P/5W

This is a 39-claim group that lies 12 km east of Heath Steele. Work consisted of an IP survey that indicated the deposit may extend to the north and may be deeper than previously thought. Three conductive targets have been outlined. Diamond drilling has been recommended to test these anomalies.

(d) CNE Claim Gp. (473750) 21 P/5W

This is a 27-claim group located 40 km northwest of Newcastle. Work on the group included IP and magnetometer surveys, trenching, diamond drilling (20 holes), metallurgical studies (RPC), and an independent ore reserve calculation. Calculations indicated 172 000 t of ore grading 7.59% Zn and 2.94% Pb. Metallurgical studies suggest that zinc recovery will be in the order of 90% while lead recovery could be 70%.

7. **NovaGold Resources Inc.**

(j) LITTLE SOUTH SEVOGLE Claim Gp. (473743) 21 O/1W

Confidential until September 18, 1991. This group of 30 claims is located approximately 105 km southwest of Bathurst. Work consisted of linecutting (24.93 km), general prospecting, geological mapping, geophysical surveys (total field, magnetic, VLF EM), and a soil geochemical survey. A total of 810 B-horizon soils were analysed for 32 elements including Au, Ag, Cu, Pb, Zn, Mn, As, Sb, and Mo.

9. **Rio Algom Exploration Incorporated**

(c) ORVAN BROOK SOUTH Claim Gp. (473649) 21 O/9E

Confidential until March 21, 1991. This 37-claim group is located 35 km west of Bathurst. Work included linecutting and soil sampling (576 samples analysed for Cu, Pb, Zn, and Au).

(d) ARMSTRONG EAST Claim Gp. (473647) 21 O/9E

Confidential until March 21, 1991. This 95-claim group is located 30 km west of Bathurst. Work included linecutting and soil sampling (1520 samples analysed for Cu, Pb, Zn, and Au).

(e) MCMASTER NORTH Claim Gp. (473648) 21 O/9E

Confidential until March 21, 1991. This 17-claim group is located 40 km west of Bathurst on the "Wild Cat" road. Work included linecutting and soil sampling (278 samples analysed for Cu, Pb, Zn, and Au).

10. **Northeast Exploration Services Limited**

(h) CAMEL BACK MOUNTAIN Claim Gp. (473747) 21 O/9W

This 15-claim group is approximately 4 km southwest of the Caribou mine and 50 km west of Bathurst. The property was staked as a result of stream sediment data (anomalous As and Sb) released by the New Brunswick Geological Surveys Branch. The anomaly was not duplicated. Six stream-silt and six heavy-mineral concentrate samples were collected and analysed for 25 elements by ICP and for Au by fire assay.

(i) TOWER Claim Gp. (473656, 473802) 21 O/8W

This group of 9 claims is approximately 60 km west-southwest of Bathurst and 1 km northwest of the Upsalquitch TV tower. Work consisted of line installation (4.9 km), and VLF, proton magnetometer and gradient magnetometer surveys. VLF and magnetic anomalies are closely related, and probably indicate northeast to east-northeast-trending rock units including the known mineralization. Additional linecutting (14.7 km), and Max-Min I and gravity surveys indicated seven weakly anomalous conductors, one of which has a small gravity anomaly. Further geophysics and diamond drilling are recommended.

(j) ROCHE LONG LAC Claim Gp. (473608) 21 P/4W

Confidential until January 10, 1991. This 3-claim group is located 10 km southeast of Heath Steele mine. Work consisted of linecutting and a Max-Min survey.

(k) LITTLE RIVER Claim Gp. (473786) 21 P/4W

Confidential until December 12, 1991. This 11-claim group is located 10 km southeast of Heath Steele mine. Work consists of a Max-Min survey and geological prospecting.

11. **Sharpe Energy and Resources Limited**

(b) LOWER TETAGOUCHE LAKE Claim Gp. (473620) 21 O/9E

This 30-claim group is located 35 km west of Bathurst at the eastern end of Lower Tetagouche Lake. The property straddles the Rocky Brook-Millstream Fault. To the south of this fault are volcanic and sedimentary rocks of the Ordovician Tetagouche Group; to the north are sedimentary rocks of the Silurian Chaleurs Group. One drill hole was completed to test coincident VLF and soil (Pb) geochemical anomalies. Drilling intersected chlorite schists, argillite, and minor felsic volcanics but no significant mineralization. No further work was recommended on the part of the claim group underlain by Tetagouche Group rocks.

13. **Falconbridge Limited**

(d) HALF MILE LAKE DEPOSIT Claim Gp. (473798) 21 O/8W

Confidential until December 15, 1991. This 30-claim group is located 68 km northwest of Newcastle, 20 km west of the Heath Steele mine, and 70 km southwest of Bathurst. Work consisted of a group boundary survey.

(e) PEAKED MOUNTAIN Claim Gp. (473746) 21 J/10E

Confidential until September 22, 1991. This 17-claim group is located 30 km north of Boiestown. Work consisted of an IP survey.

(f) DUNGARVON EAST Claim Gp. (473722) 21 J/10E

This is an 11-claim group located 20 km north of Hayesville. It lies on the Little Dungarvon River in the area of the Cleaveland prospect that was discovered in 1959. Work consisted of an IP survey that yielded one interesting anomaly. This anomaly may be explored by diamond drilling.

14. Lacana Mining Coroporation Limited

(b) MIDDLE RIVER SOUTH Claim Gp. (473661) 21 O/9E

This group of 68 claims is located approximately 35 km west-southwest of Bathurst. It is underlain by volcanic rocks of the Ordovician Tetagouche Group. Work consisted of linecutting (52.6 km), and proton magnetometer and VLF EM-16 surveys. Several EM conductors were delineated; positive magnetic anomalies are thought to reflect mafic volcanic rocks. A soil geochemical survey and further linecutting and geophysics have been recommended.

25. Acadia Mineral Ventures Limited

(b) TETAGOUCHE (Project) Claim Gp. (473644) 21 O/9E

The Tetagouche project consists of the Tetagouche, Tetagouche South, and Millstream West Joint Venture claim groups (a total of 288 claims). They are located approximately 19 km west-northwest of Bathurst. The area is underlain by mafic and felsic volcanics and sedimentary rocks of the Ordovician Tetagouche Group. Work consisted of linecutting (10.3 km); general prospecting, soil geochemistry (4976 samples), geophysical surveys (Max-Min EM, magnetometer, IP, and gravity), trenching (7 totalling 282 m), and diamond drilling (5 holes totalling 779 m).

Analysis of B-horizon soils for 28 elements by ICP and for Au by fire assay outlined several anomalies of Pb, Zn, Cu, Ag, As, Au, Fe and Ba. Several conductors, and gravity and magnetic anomalies were delineated. Eighty-seven rock and massive sulphide boulder samples were analysed, with values up to 674.1 g/t Ag, 2.1 g/t Au and 3.79% Pb-Zn. Trenching in areas of massive sulphide boulders uncovered silver-gold-arsenopyrite and massive sulphide mineralization. Diamond-drill holes, to test geophysical anomalies and mineralization in trenches, intersected several anomalous zones of Ag, Au, Pb and Zn. Further work is recommended.

(c) TETAGOUCHE LAKES Claim Gp. (473633) 21 O/9E

This 88-claim group is located approximately 50 km west of Bathurst. The area is underlain by sedimentary, felsic volcanic, and mafic volcanic rocks of the Ordovician Tetagouche Group. Upper Silurian Chaleurs Group sedimentary rocks occur in the northwest corner of the claim group. Work consisted of linecutting (50.2 km), and proton magnetometer and VLF EM-16 surveys. Four VLF anomalies, three with coincident magnetic anomalies, were delineated. Trenching, detailed geochemistry, further geophysics, and follow-up drilling are recommened.

(d) CALIFORNIA LAKE EAST and the 21 O/9E
BEAVER LAKE Claim Gps. (473629) 21 O/8E

The California Lake East group consists of 130 claims and the Beaver Lake group comprises 8 claims. The groups are approximately 39 km west of Bathurst and 24 km north of the Heath Steele mine. The area is underlain by mafic and felsic volcanics and sedimentary rocks of the Ordovician Tetagouche Group. Work consisted of linecutting (40.7 km), general prospecting, soil geochemistry (4586 samples), lithogeochemistry (38 samples), and proton magnetometer and VLF EM-16 surveys. Linear VLF and

magnetic anomalies trend north-south. Some are coincident with soil geochemical anomalies. Soil samples, analysed for 28 elements by ICP, outlined several anomalous areas of Zn (>250 ppm), Pb (>100 ppm), Ag (>1 ppm) and/or Sb (>1 ppm). Further work is planned on the anomalous areas.

(e) ARMSTRONG BROOK Claim Gp. (473645) 21 P/12W

Confidential until March 19, 1991. This block of 172 claims is located about 20 km west of Bathurst. Work included linecutting, Max-Min and EM surveys, and collection of 1909 soil samples, which were analysed for Cu, Pb, and Zn.

(f) NINE MILE BROOK Claim Gp. (473742) 21 O/8E

This group of 12 claims is located approximately 11 km southwest of the Brunswick No. 12 mine. The property is underlain by mafic and felsic volcanic and metasedimentary rocks of the Ordovician Tetagouche Group. Work consisted of prospecting, and silt and rock geochemistry. A total of 17 rock samples were analysed yielding values of up to 68 ppm Pb, 800 ppm Zn, 1.7 ppm Ag, 104 ppm As and 219 ppb Au. Detailed mapping, prospecting, trenching, and diamond drilling have been recommended.

26. East West Caribou Mining Limited

(a) MCMASTER Claim Gp. (473780) 21 O/9W

This 24-claim group is located approximately 43 km west of Bathurst. The McMaster property is located near the Caribou and McMaster massive sulphide deposits. The area is underlain by mafic volcanics, quartz-sericite schist, quartz and/or feldspar schist and chlorite schist of the Ordovician Tetagouche Group. Work consisted of linecutting (32.7 km), preliminary geological mapping, lithogeochemistry, and a soil geochemical survey. Seven rock samples were analysed for 32 elements by ICP. The 32-element ICP analysis of 1180 B-horizon soil samples gave results up to 1295 ppm Zn, 4590 ppm Pb, 256 ppm Cu and 1945 ppm As. Nine anomalous trends and three isolated anomalies were delineated. Further mapping, geochemistry, geophysics, and trenching were recommended.

(b) WOODSIDE BROOK Claim Gp. (473714) 21 O/9W

This 50-claim group is located approximately 50 km west of Bathurst and 1 km southeast of the Caribou mine. The area is underlain by felsic volcanic, and minor sedimentary and mafic volcanic rocks of the Ordovician Tetagouche Group. A boundary survey (totalling 12.84 km) was conducted as a requirement for the claims being added to the Caribou Mining Lease.

27. Sevogle Exploration Inc.

(a) MIDDLE RIVER Claim Gp. (473806) 21 O/9E

Confidential until December 29, 1991. This 36-claim group is located approximately 32 km west of Bathurst. General prospecting and geological mapping were carried out. One trench (totalling 110 m) was completed. A total of 55 rock and 63 till samples were collected and analysed for Au plus other elements. Eighteen rock samples were sent for whole-rock analysis.

(b) OTTER LAKE #1 Claim Gp. (473755) 21 O/8E

Confidential until October 20, 1991. This 36-claim group is located approximately 9 km west-northwest of the Heath Steele mine. Four diamond-drill holes (totalling 501.79 m) were completed.

(c) OTTER LAKE #2 Claim Gp. (473754) 21 O/8E

Confidential until October 20, 1991. This 9-claim group is located approximately 9 km west-northwest of the Heath Steele mine. Work consisted of general prospecting, rock geochemistry, and two trenches (totalling 25 m). Twenty-four rock samples from the trenches were analysed for Au plus 10 other elements.

(d) SLACKS LAKE Claim Gp. (473726) 21 O/1W

Confidential until August 10, 1991. This 219-claim group is located approximately 25 km west-southwest of the Heath Steele mine. Eight diamond-drill holes totalling 1102.02 m were drilled and core samples analysed for 14 elements.

28. **Claude A. Willett**

(a) MIDDLE RIVER Claim Gp. (473801) 21 P/12W

Confidenital until December 11, 1991. This group of 65 claims is located approximately 25 km west of Bathurst in the area of Little River. Work on the block included linecutting, VLF and magnetometer surveys, and the collection of 1500 B-horizon soil samples that were analysed for Cu, Pb, Zn, Ag, As, Sb, and Au.

(b) MIDDLE RIVER Claim Gp. (473681) 21 P/12W

This is a 20-claim group located about 20 km southwest of Bathurst. Work consisted of VLF and proton magnetometer surveys. As a result, two magnetic and five VLF anomalies were delineated. Geologic mapping, soil sampling, and more geophysical surveying are being considered for the group.

(c) MIDDLE RIVER Claim Gp. (473611) 21 P/12W

This is a 16-claim group located approximately 20 km southwest of Bathurst. A total of 87 soil samples were assayed for As, Au, Cu, Pb and Zn. The highest gold value was 25 ppb Au. In addition to soil sampling, an EM-16 survey was carried out, which showed several pronounced anomalies. Additional work is required to fully assess the property.

(d) LITTLE RIVER LAKE Claim Gp. (473712) 21 O/8E

This 12-claim group is situated about 50 km southwest of Bathurst. Work consisted of grid establishment (5.5 km), prospecting, soil sample collection (185 B-horizon), and a VLF EM-16 survey. Two conductors were delineated and a float sample yielded 156.0 g/t Ag. Further work is planned.

(e) LONE PINE OPTION Claim Gp. (473757) 21 P/5W

This group of 47 claims is located 30 km southwest of Bathurst and 2 km north of Lovalls Lake. A total of 110 till samples were assayed for base metals and Au pathfinder elements. In addition, 110 heavy-mineral concentrate samples were assayed for Au. This sampling outlined an anomalous Au trend. Further work is dependent on the results of the soil survey.

(f) NINE MILE BROOK Claim Gp. (473804) 21 O/8E

This 16-claim group is located approximately 10 km southwest of the Brunswick No. 12 mine and 18 km north-northeast of the Heath Steele mine. Work consisted of linecutting (7.6 km), diamond drilling (totalling 427 m), and a gravity survey. No economic mineralization was intersected in the two holes drilled. Most of the rocks intersected were argillites and mafic volcanics. One weak gravity anomaly was found and further gravity work is recommended.

(g) NINE MILE BROOK Claim (473700) 21 O/8E

This claim is approximately 53 km southwest of Bathurst. Work consisted of line installation (5.6 km) and a VLF EM-16 survey. Geophysical anomalies may be associated with a sulphide zone that was outlined by previous work. Further work is recommended.

29. **Donald C. Graham**

HEADWAY NORTH Claim Gp. (473615) 21 P/5W

Confidential until January 22, 1991. This group of 10 contiguous claims is located approximately 2.5 km south-southwest of Brunswick No. 12 mine. Work consisted of collection and analysis of 91 B-horizon soil samples for Cu, Pb, and Zn.

30. **Ian A. Graham**

HEADWAY Claim Gp. (473616) 21 P/5W

Confidential until January 22, 1991. The property is located on the south side of the Brunswick No. 6 Grant. Work included magnetometer and SP surveys, and collection of water, silt, soil, and rock samples that were analysed for Cu, Pb, Zn, and As. In addition, a mineralogical study was completed.

31. **John A. Duffy**

1248 Claim Gp. (473729) 21 P/5W

This 6-claim group is in the area of North Ninemile Brook, 18 km south of the City of Bathurst and 6 km west of the mined-out Brunswick No. 6 pit. Granges Exploration Ltd. took 116 soil samples on the property and assayed them for a multi-element suite. This work yielded a Pb-Zn anomaly. A follow-up programme of trenching is planned for next year.

32. **Key Anacon Mines Limited**

(a) KEY ANACON MINE Claim Gp. (473774) 21 P/5E

Confidential until November 22, 1991. This group of 83 claims lies on the Nepisiguit River about 20 km south of Bathurst. Work consisted of a mine feasibility study and site reclamation work.

(b) KEY ANACON MINE Claim Gp. (473631, 473775) 21 P/5E

The Key Anacon claims are 20.5 km south of the City of Bathurst on the Nepisiguit River and Highway 360. These reports outline site reclamation for the Key Anacon mine site. The shaft was capped, and the waste-heaps were reshaped and capped with gravel and a compacted layer of glacial till. A monitoring system was set up to monitor the surface runoff of acid and disolved metals from the heaps.

33. L. Paul Zed

CANOE LANDING LAKE Claim Gp. (473675) 21 O/8E

Confidential until April 25, 1991. This 81-claim group is located approximately 42 km southwest of Bathurst. Work consisted of a geocompilation of previous work, linecutting (35 km), and magnetic and VLF surveys.

34. Mattagami Lake Exploration Limited

(a) HALFMILE LAKE NORTH Claim Gp. (473784) 21 O/8W

Confidential until December 7, 1991. This 18-claim group is located approximately 20 km west of the Heath Steele mine. Work consisted of geological mapping, rock geochemistry (25 samples), and a compilation of data from 87 holes that were previously drilled.

35. Thomas Jamieson and John Duffy

TAYLOR BROOK Claim Gp. (473694) 21 O/8E

This 28-claim group is situated 8 km north of the Heath Steele mine. The property is underlain by Ordovician felsic volcanic, minor mafic volcanic and tuffaceous sedimentary rocks within a mineralized horizon believed to be on strike with the Stratmat deposits. Work consisted of trenching (435 m), rock and till geochemistry, and IP and HLEM surveys. Coincident HLEM conductors and IP anomalies indicate a southerly dip and probable thickening of the Taylor Brook deposit. Lithogeochemistry on samples from the trenches indicates values up to 82.3 g/t Ag, 1.03 g/t Au with 1 m of 7.1% combined Pb-Zn. Gossan samples yielded up to 1.03 g/t Au but appear to have too much base metal content to make separation and leaching feasible. Diamond drilling, linecutting and a Max-Min II survey are recommended.

36. Noranda Exploration Company, Limited

(a) STRATMAT Claim Gp. (473748) 21 O/8E

Confidential until September 26, 1991. This group of 56-claims lies on the northern boundary of the Heath Steele mine property. Work consisted of geophysics, UTEM, gravimetric and down-hole EM surveys. In addition, 37 till and B-horizon soil samples were collected and analysed. A total of 40 holes were drilled (23 791 m) and composite assays were obtained for 33 of them.

(b) HALF MILE LAKE CENTRAL Claim Gp. (473735) 21 O/8W

Confidential until January 27, 1991. This 25-claim group is located approximately 67 km northwest of Newcastle and 15 km west of the Heath Steele mine. General prospecting and geological mapping were carried out. Ten diamond-drill holes (totalling 7290.8 m) were completed and assayed for Cu, Pb, Zn, and Ag. Borehole and surface surveys were also done.

37. **Kenneth D.A. Whaley**

(a) STRATMAT NORTH Claim Gp. (473662) 21 O/8E

The Stratmat North group of 12 claims is 5 km northwest of the Heath Steele mine and 1 km northwest of the Stratmat Main deposit. The group is underlain by felsic volcanic, sedimentary, and minor mafic volcanic rocks of the Ordovician Tetagouche Group. Work consisted of trenching (totalling 88 m) and lithogeochemistry on 41 channel samples for Cu, Pb, Zn, Ag and Au. Although no anomalous results were obtained, further work is recommended.

(b) MANZER BROOK Claim Gp. (473689) 21 J/6E

This 4-claim group is on the Valley Products road, 10 km south of Napadogan and adjacent to Manzer Brook. The property is underlain by Cambro-Ordovician graphite and sandstone, which locally are cut by quartz-carbonate stringers and intruded by Devonian granite. Soils sampled on the property contain anomalous amounts of base metal sulphides, but the bedrock source is not known. No significant mineralization was intersected in four holes drilled by U.S. Borax in 1983.

38. **Granges Exploration Ltd.**

(a) GOODWIN LAKE-MALISEET Claim Gp. (473678) 21 O/8W

Confidential until April 30, 1991. This group of 30 claims is located approximately 64 km southwest of Bathurst. A 3.55 km grid was cut and magnetometer and Max-Min surveys were carried out. Six diamond-drill holes (totalling 590.19 m) were completed.

(b) AIRSTRIP Claim Gp. (473693) 21 O/1E

Confidential until June 5, 1991. This group of 83 claims is located approximately 60 km southwest of Bathurst. Work consisted of line-cutting (115.48 km) and a Max-Min electromagnetic survey.

(c) CLEARWATER LAKE Claim Gp. (473711) 21 O/1W

Confidential until July 4, 1991. This 88-claim group is located approximately 60 km northwest of Newcastle. A total of 1195 B-horizon soil samples were collected and analysed for 28 elements plus Au.

39. **Arnold Somers**

LITTLE SEVOGLE RIVER Claim Gp. (473650) 21 J/16E

This 4-claim group is located 1 km west-southwest of the confluence of the north and south branches of the Little Sevogle River. Prospecting, trenching, and sampling (8 soil and 5 rock samples) were carried out. No anomalies were found.

40. **Robert J. Connor**

HOWLAND RIGDE Claim Gp. (473769) 21 J/3E

This 5-claim group is about 11 km northeast of Millville. The area is underlain by Cambro-Ordovician felsic volcanic and sedimentary rocks. Small amounts of base metal sulphides and anomalous gold were found in two rock samples from the property.

41. **Maritime Resource Research Ltd.**

(a) BULLS CREEK Claim Gp. (473668) 21 J/4E

This 24-claim group is 5 km south of the Town of Woodstock. The claim group is underlain by Cambro-Ordovician sedimentary rocks that are intruded by Ordovician granodiorite porphyry. Several copper sulphide occurrences with small amounts of gold (up to 1.2 g/t Au) have been found in the intrusion and metasedimentary rocks in the contact aureole. Maritime Resource Research conducted a till and rock sampling programme around the Gibson granodiorite porphyry. Several rock samples from the eastern part of the claim group contained anomalous amounts of gold (up to 230 ppb Au).

42. **Derek F. Brown**

(a) EEL RIVER Claim Gp. (473761) 21 G/13E

This 4-claim group is along Route 2, 80 km west of Fredericton. The area is underlain by Cambro-Ordovician sedimentary rocks, felsic tuff, and basalt that define a westerly plunging synform. In the mid-1950s, American Metals Co. Ltd. conducted a geophysical survey and drilled six holes on the property. One drill hole intersected disseminated galena, chalcopyrite and pyrite in narrow quartz veins over 1 m. Between 1976 and 1983, Boliden-Preussag, Price Co. Ltd., and BP Canada Inc. conducted magnetic, electromagnetic and soil geochemical surveys on the property. Two base metal anomalies appear to be reflected by EM conductors. A limited amount of diamond drilling was carried out to test these anomalies. In 1989, E.D. Brown sawed several of the available diamond-drilled cores that were stored in the DNRE core storage facility in Fredericton. Anomalous amounts of base metal sulphides were found in several samples.

FREDERICTON ZONE

1. **Brunswick Mining and Smelting Corporation Limited**

(gg) SCOTCH LAKE GRID Claim Gp. (473638) 21 G/15W

Confidential until February 28, 1991. This 71-claim group is about 9 km southwest of the northeastern extremity of the Pokiok Batholith and about 2.5 km southwest of Scotch Settlement. It is underlain by Silurian greywacke and slate in the contact aureole of the batholith. It covers an aeromagnetic anomaly reported by the Geological Survey of Canada, which

could reflect a satellite pluton similar to the one associated with the Lake George antimony gold deposit. Detailed soil geochemical and magnetic surveys were conducted by Brunswick on the property.

(hh) WATERLOO LAKE GRID Claim Gp. (473639) 21 G/15W

Confidential until February 28, 1991. This 44-claim group is in Prince William, southwest of the Saint John River and northeast of the Lake George antimony mine. The area is underlain by tightly folded Silurian greywacke and slate. The claim group covers an aeromagnetic anomaly delineated by the Geological Survey of Canada in 1958. Brunswick conducted ground magnetic and soil geochemical surveys on the property.

43. Dominion Explorers Inc.

Durham Mines Property, M. Licence 1235 (473659) 21 G/14E

Confidential until April 2, 1991. This property covers the area surrounding the Lake George antimony mine, 40 km southwest of Fredericton. The company conducted a limited underground exploration programme to evaluate part of a gold-bearing skarn that was intersected by diamond drilling in 1981.

ST. CROIX ZONE

1. Brunswick Mining and Smelting Corporation Limited

(ii) HENDERSON SETTLEMENT Claim Gp. (473716) 21 H/12W

This 32-claim group is immediately south of Henderson Settlement and southwest of the PGE Resource Corp. Henderson Settlement group. It constitutes part of the same major fault zone. Anomalous gold values are associated with distinct arsenic-antimony anomalies. A VLF EM survey delineated several strong northeast-striking conductors and one possible north-south one. One strong conductor coincides with a well-developed As-Sb-Au anomaly. Follow-up trenching was conducted on the property.

(jj) CRANBERRY LAKE Claim Gp. (473805) 21 G/9E

This 33-claim group is east of the Settlement of Wickham about 5 km east of the Saint John River and constitutes part of the same fault zone as the McCrea Farm claim group of BP Resources Canada Limited to the northeast. The company conducted a reconnaissance till sampling survey on the property. Several gold anomalies (>50 ppb Au) with a high of 1156 ppb Au were found. Most gold anomalies are coincident with elevated Sb, Pb, and Zn values.

5. BP Resources Canada Limited

(e) STEWARTON Claim Gp. (473740) 21 H/12W

This 130-claim group is northeast and southwest of the settlement of Stewarton, which is immediately southwest of the LAC Minerals (Inco Gold) claim group and constitutes part of the same major fault zone. The company

conducted an extensive soil geochemical programme on the property in which samples from both the B- and C-horizons were collected and analysed for 33 elements including gold. Gold values ranging from <5 ppb to 100 ppb Au were detected. Several distinct anomalies were delineated with the aid of the pathfinder elements. Prospecting on the grid uncovered a quartz vein boulder that assayed 2650 ppb Au.

(f) TAYLOR BROOK Claim Gp. (473736) 21 H/12W

This 9-claim group is about 7 km north of the Village of Springfield and immediately south of the BP Stewarton claims. The area is underlain by Ordovician/Silurian mafic-felsic volcanic and sedimentary rocks and it is transected by the Ketchum Brook Fault. This fault constitutes the boundary between the Avalon (Caledonia) and St. Croix terranes. The company prospected and conducted soil geochemical surveys on the property. The highest gold content was found in a sheared, sericitized, silicified, and pyrite-rich boulder that assayed 1480 ppb Au. Soil geochemistry delineated a prominent multi-element anomaly characterized by Ag, Cu, Pb, Zn, As and locally including Au, Sb and Mo. Several small, strong multi-element anomalies also were found on the property.

(g) McCREA FARM Claim Gp. (473745) 21 H/12W

This claim group is about 0.5 km east of the Village of Shannon on Highway 705 and southwest of the Brunswick Mining and Smelting Henderson Settlement claim group and is associated with the same major regional fault zone. In 1957, Rio Canadian Exploration conducted soil geochemical and EM surveys and drilled two holes, which intersected disseminated pyrite and minor chalcopyrite.

In 1988, the Geological Survey of Canada published the results of a reconnaissance lake- and stream-sediment geochemical survey, which drew attention to the area west of Albright Brook. Two streams and a small pond yielded anomalous Au, As, Sb and Zn. The 1989 programme conducted by BP was designed to determine the source of these gold anomalies. An extensive soil sampling programme with multi-element geochemical analyses was conducted on the property. This confirmed that the Albright Brook area was highly anomalous, with soils yielding assays up to 80 ppb Sb, 365 ppm As and 65 ppb Au. Magnetic and electromagnetic surveys are planned to delineate possible shear zones that may contain the bedrock source of the gold.

19. **LAC Minerals Limited**

(b) ANNIDALE Claim Gp. (473640) 21 H/13W

This 60-claim group is 5 km north of the Village of Belleisle Creek and 35 km northwest of the Town of Sussex. The claim group covers a prominent fault zone that juxtaposes Cambro-Ordovician and Silurian metasediments and mafic-felsic flows and tuff. The Ketchum Brook Fault, which constitutes the southern boundary of this intensely deformed zone, separates the St. Croix and Avalon tectonostratigraphic terranes.

LAC Minerals conducted an IP survey over areas with anomalous Au, Ag, Cu, Pb, and Zn in soils. Seven short holes were drilled to test five IP anomalies. All holes intersected intensely sheared and altered sedimentary

and volcanic rocks. One hole intersected 3.12 g/t Au over 1.52 m. The host rocks are intensely carbonatized, silicified, and chloritized. Chrome mica alteration also was intersected in the hole. The Annidale claim group of LAC Minerals Limited was taken over in 1989 by Inco Gold Company who conducted a trenching and diamond-drilling programme.

41. Maritime Resource Research Ltd.

(b) BAULD HILL Claim Gp. (473728) 21 G/9W

Confidential until August 23, 1991. This 111-claim group is east of the Settlement of Wickham, about 3 km east of the Saint John River and is part of the same major fault zone as Brunswick Mining and Smelting Cranberry Lake group. This area has been explored by several companies since 1957. Maritime Resource Research Ltd. recently conducted an extensive till sampling programme on the claim group.

44. PGE Resource Corp.

(a) HENDERSON SETTLEMENT Claim Gp. (473793) 21 H/12W

Confidential until December 12, 1991. This 114-claim group at Henderson Settlement is southwest of the BP Resources Stewarton claim group and occurs in the same major fault zone. The company prospected and conducted stream sediment, soil, and rock geochemical surveys on the property.

45. Edgar Brown

THREE BRIDGE BROOK Claim Gp. (473727) 21 G/8W

This 13-claim group is in the northeastern Saint George Batholith immediately south of the contact with Ordovician/Silurian metasediments. Two base metal sulphide occurrences have been found in sheared Late Devonian granite. Mr. Brown conducted VLF EM and proton magnetometer surveys on the property. Three anomalies were trenched. Analyses of sheared and altered granite with quartz veins and disseminated pyrite yielded anomalous gold.

46. William E. Carter

BALD HILL Claim Gp. (473773) 21 G/7E

This 5-claim group is in intensely sheared Ordovician/Silurian metasedimentary rocks along the northeastern contact of Late Devonian granite of the northeastern Saint George Batholith. The ground was prospected in 1989 and sulphide-bearing float was found in several localities on the claim group. Samples returned up to 6 g/t gold and high antimony.

47. Grand Empire Exploration Limited

SAND BROOK MOUNTAIN Claim Gp. (473690) 21 G/7E

This 50-claim group is in intensely sheared metasediments along the northeastern contact of the Saint George Batholith near South Oromocto Lake.

Arsenopyrite occurrences along Sand Brook were first found around 1927. Uranerz Exploration and Mining Ltd. conducted the first intensive exploration programme in this area, which included geological mapping, radiometric, VLF EM, and magnetic surveys. In 1983, the Geological Surveys Branch conducted a till geochemical survey over the eastern Saint George Batholith, which detected anomalous Au, Zn, Pb, and Cu in the area. In 1987, Rio Algom Exploration conducted a rock chip sampling survey in the vicinity of an arsenopyrite-gold occurrence that was found on the property by Dr. Winfried Brack. Two samples from the vein assayed 17.8 and 2.7 g/t Au. Five other samples collected in the surrounding hornfels yielded trace amounts of gold. Grand Empire trenched part of the property and conducted proton magnetometer, VLF EM, IP, and soil-geochemical surveys on the property. Several EM and IP anomalies coincide. The extent of the vein system was tested by closely spaced diamond-drill holes. Trace amounts of gold grading up to 3180 ppb Au over 0.3 m were intersected. No significant grade assays similar to the surface samples were encountered in the relatively small area that was drilled.

48. Peter Fenety and Roy McIntyre

SHEAR GOLD MINE Claim Gp. (473695) 21 G/7E

This 16-claim group is in Ordovician/Silurian metasediments in the contact aureole of the Saint George Batholith, 6 km northeast of South Oromocto Lake. Rock samples collected from a silicified outcrop have yielded up to 17.1 g/t Au. As a result of this, Stratabound Minerals Corp. optioned the property and conducted magnetometer, VLF EM, and soil-geochemical surveys as well as trenching on the property. Anomalous amounts of gold and base metal sulphides were found in one trench.

49. Goldfluor Exploration Limited

(a) JIMMY HILL Claim Gp. (473632) 21 G/7E

This 21-claim group is in a sheared metasedimentary inclusion in Devonian granodiorite, 1 km north of South Oromocto Lake. The granodiorite represents one of the early phases of the Saint George Batholith. Numerous northeast- and northwest-striking auriferous quartz veins have been found in the area. A 50 m^2 area was trenched, from which 97 rock samples were collected for chemical analyses. Assays ranged from 1000 ppb to 21.1 ppm Au. VLF EM, magnetic and soil geochemical surveys were also conducted on the property. The mineralized area coincides with a weak VLF EM and a distinct magnetic anomaly.

(b) WAWEIG Claim Gp. (473768) 21 G/6E

This 33-claim group is immediately east of Tower Hill, about 15 km northeast of the Town of St. Stephen. The property is underlain by Ordovician graphitic slate and quartzite. The penetrative cleavage is deformed by a prominent northeast-striking shear zone that produced steeply plunging cross folds. High-grade quartz-carbonate veins occur near the contact of the quartzite and slate, and along the crests of cross folds. A 76 cm channel sample across one of the veins assayed 50.4 g/t Au, 47.3 g/t Ag, and 0.29% Co. The company trenched the extension of the previously exposed vein system and one hole was drilled.

50. Cobrun Mining Corporation

(a) ST. STEPHEN NICKEL Claim Gp. (473686) 21 G/3W

Confidential until May 18, 1991. This 49-claim group is 2 km northwest of the Town of St. Stephen, in southwestern New Brunswick. The claims cover the principal copper-nickel deposits in the Middle Devonian St. Stephen mafic-ultramafic complex. In addition to nickel and copper, the deposits contain small amounts of platinum group elements. The first nickel-copper sulphide occurrences were found in the area around 1880 and active exploration started around 1928. Numerous companies have investigated the feasibility of putting the deposit in production, but conventional metallurgical methods were difficult to apply to this complex ore. In 1984, Cobrun Mining and Gordel Investments became interested in the property when bench-scale bacterial leaching indicated the possibility of extracting the various metallic elements from the ores using this method. The tests produced a large quantity of leachate, which will be used by the New Brunswick Research and Productivity Council to develop an efficient method for extracting the metal. In addition to metallurgical investigations, the company also did some prospecting on the claim group to search for possible new mineralized outcrops.

MASCARENE ZONE

42. Derek F. Brown

(b) JAKE LEE BROOK Claim Gp. (473782) 21 G/2E

This 15-claim group is about 10 km north of the Village of Pennfield. The southern part of the property is underlain by Silurian mafic and felsic volcanic and sedimentary rocks that have been intruded by a gabbro sill. The northern part of the property is intruded by granite of the Saint George Batholith. The area is transected by several prominent northeast and north-northeast-striking faults. The claim group has been explored since 1967 by several companies including New Jersey Zinc Exploration Company, Essex Mineral Company, and Rio Algom Ltd. Early exploration in the area was activated by highly anomalous amounts of Cu, Pb, and Zn found in stream sediments. In 1983 Derek Brown analysed 20 stream-sediment samples for gold and six of these yielded in excess of 100 ppb Au. The following year Rio Algom collected 33 samples of which six yielded in excess of 1000 ppb Au. Check samples yielded up to 5280 ppb Au. Recent work included VLF EM, magnetometer and soil geochemical surveys. These surveys detected three conductors that corresponded with IP anomalies reported by New Jersey Zinc. One conductor also has a well defined associated soil anomaly.

44. PGE Resource Corp.

(b) TENNANTS COVE Claim Gp. (473795) 21 H/12W

Confidential until December 12, 1991. This 12-claim group is west of the PGE Jenkins Cove group and north of Tennants Cove. The area is

underlain by Silurian sedimentary and volcanic rocks, which are intruded by diorite and gabbro. The property was mapped and prospected, and a soil geochemical survey was carried out.

(c) BEULAH Claim Gp. (473794) 21 H/12W

Confidential until December 12, 1991. This claim group is northwest of the Jenkins Cove property of PGE Resource Corp. The southern part of the claim group is underlain by Silurian mafic volcanic and sedimentary rocks. The northern claims are underlain by Silurian mafic volcanic and sedimentary rocks. The Wheaton Brook Fault is about 2 km south of the claim group. The ground was prospected and a till-geochemical sampling programme was carried out.

(d) JENKINS COVE Claim Gp. (473792) 21 H/12W

Confidential until December 12, 1991. This claim group is about 700 m north of Jenkins Cove along Belleisle Bay. The area is immediately north of the Belleisle Bay Fault and the Wheaton Brook Fault transects the claim group. Most of the property is underlain by Silurian mafic volcanic and sedimentary rocks. The ground was staked to cover a stream-sediment anomaly detected by the Geological Survey of Canada. The company prospected, trenched, and conducted a soil geochemical survey on the property.

(e) KARS Claim Gp. (473791) 21 H/12W

Confidential until December 12, 1991. This 4-claim group is just north of Belleisle Bay, about 4 km east of the Evandale Ferry Landing, along the Saint John River. The area is underlain by Silurian mafic volcanic and sedimentary rocks that are intruded by numerous mafic dykes. The Belleisle Fault crosses immediately south of the property and the Wheaton Brook Fault is to the north. The company conducted a soil geochemical programme and trenched on the property. Samples were analysed for Au and As.

(f) BULL MOOSE HILL Claim Gp. (473790) 21 H/12W

Confidential until December 12, 1991. This 24-claim group is south of the LAC Minerals Limited (Inco Gold Company) Annidale claim group and southwest of the Corona Corporation Irish Settlement property. The claim group is transected by the Wheaton Brook Fault. The company prospected and conducted a soil geochemical survey on the property.

50. Cobrun Mining Corporation

(b) KEATINGS CORNER-NEREPIS Claim Gp. (473622) 21 G/8W

Confidential until February 6, 1991. This 58-claim group is at Nerepis, 22 km northwest of the City of Saint John. The property is transected by the Wheaton Brook Fault, which separates Late Precambrian-Cambrian and Silurian metasedimentary and volcanic rocks. The western part of the property is intruded by Late Devonian granite of the Saint George Batholith. Numerous mafic and felsic sills and small stocks occur farther to the east. The property has been prospected since the early 1950s and numerous base metal veins were found. More recently, a zoned skarn deposit with base metal sulphides, tin, and tungsten has been delineated. In 1986, a

low-grade gold-bearing fracture zone was discovered in a road cut 700 m west of the property. Cobrun conducted an extensive soil geochemical survey to determine the gold potential of the property. Available geological and geophysical data covering the property also was compiled.

51. **James Kelly**

OVENHEAD Claim Gp. (473799) 21 G/2W

This 35-claim group is along the north shore of Passamaquoddy Bay, about 6 km northwest of the Town of St. George. The area is underlain by Lower Devonian felsic and mafic volcanic and sedimentary rocks, which are locally intruded by narrow dykes. The volcanic sequence is locally cut by narrow fracture zones with quartz carbonate, galena, sphalerite and locally chalcopyrite and bornite. The area has been prospected since 1967 when a stream-sediment geochemical survey showed highly anomalous amounts of Pb, Zn, and Cu. Between 1967 and 1985 the Keevil Mining Group, BP Resources Canada Limited and Mactaquac Mining Ltd. conducted geophysical and geochemical surveys on the property. J. Kelly prospected the ground and found several low-grade base metal sulphide occurrences, but no significant amounts of gold were reported.

52. **Lombard Consolidated Resources Inc.**

NEREPIS Claim Gp. (473797) 21 G/8W

Confidential until December 13, 1991. This 26-claim group is centered around West Lake, west of the Village of Nerepis. The Wheaton Brook Fault crosses this claim group. The area is underlain by Precambrian and Silurian volcanic and sedimentary rocks that are separated by the Wheaton Brook Fault. The western part of the claim group is intruded by Late Devonian granite of the Saint George Batholith. Numerous base metal sulphide veins and a skarn deposit have been found. In 1970, one drill hole in the skarn intersected 7.9 m assaying 0.34 g/t Au and 18.1 g/t Ag. The company conducted soil geochemical, magnetometer, and IP surveys to assist in the delineation of auriferous deposits in the claim group.

53. **Costigan Gold Corporation**

EVANDALE Claim Gp. (473643) 21 G/9E

Confidential until March 12, 1991. This 70-claim group is immediately west of the Village of Evandale, along the west side of the Saint John River. The claims cover an extensive gold-bearing copper-molybdenum zone in the northwestern part of the Middle Devonian Evandale granodiorite stock. Drilling by Dome Exploration in 1979 intersected several gold-bearing sections assaying 7.2-16.1 g/t Au over 15-51 cm. The company conducted VLF EM and soil geochemical surveys to identify drill targets on the property.

CALEDONIA ZONE

14. Lacana Mining Corporation Limited

(e) POLLETT RIVER Claim Gp. (473718) 21 H/11E

This 24-claim group is 13 km northwest of the Village of Alma, along the Bay of Fundy coast area. The area is underlain by Late Precambrian mafic and felsic volcanic and associated sedimentary rocks. The property originally was staked because of two anomalous stream-sediment samples assaying, respectively, 9 and 10 ppb Au. The stream-sediment survey was conducted by the Geological Survey of Canada. Subsequent work by Lacana confirmed the anomalies. The bedrock in the area was locally affected by carbonatization, silicification, sericitization and illitization. Pyrite and talcose alteration are also common.

37. Kenneth D.A. Whaley

(c) CHANCE HARBOUR Claim Gp. (473653) 21 G/1W

This 4-claim group is 20 km southwest of the City of Saint John, along the Bay of Fundy. The area is underlain by Precambrian mafic to felsic volcanic and granitoid rocks that are thrust over Carboniferous sedimentary rocks. Several ore-grade gold and base metal sulphide occurrences have been found in this coastal region in recent years. Rex Silver Mines Ltd. found an extensive quartz-carbonate injection zone with several base metal sulphide occurrences along its northern contact. An IP survey was conducted on the property by Kenneth Whaley and an anomaly was delineated along the northern margin of the quartz-carbonate-injected zone.

(d) LITTLE STREAM Claim Group (473654) 21 H/10W

This 24-claim group is located along the Albert-Alma road, 15 km east of Fundy National Park. It was examined for gold and silver potential using VLF and magnetometer surveys as well as limited soil sampling and analysis. Twenty-two B-horizon soil samples were collected and analysed for Cu, Pb, Zn, Ag, and As. The highest values obtained were 40 ppm Cu, 40 ppm Pb, 96 ppm Zn, 1 ppm Ag, and 3 ppm As.

41. Maritime Resource Research Ltd.

(c) BLACK RIVER Claim Gp. (473721) 21 H/5W

This 33-claim group is about 10 km southeast of the City of Saint John, along the Bay of Fundy coast. The area consists of several northeast-striking fault blocks composed of Precambrian mafic and felsic volcanic and granitoid rocks, and Carboniferous or older sedimentary rocks. All these rocks are intensely deformed and exhibit a well-developed penetrative cleavage. The company conducted stream-sediment, till, and rock geochemical surveys on the property. One stream-sediment sample assayed 1800 ppb Au. Tills north of this locality in places assayed between 10 and 34 ppb Au.

54. Morton Gordon

(a) EAGLE LAKE Claim Gp. (473680) 21 G/8W

Confidential until May 1, 1991. This 8-claim group is between Loch Alva and West Musquash Lake, 24 km northwest of the City of Saint John, and 10 km north of the Village of Musquash. The area is underlain by Devonian granite that intrudes Precambrian mafic to felsic volcanic and sedimentary rocks. The area is transected by the northeast-trending Belleisle Fault. Mineralized fracture zones carrying chalcopyrite and pyrite with minor tetrahedrite, galena, and gold occur in fracture zones that roughly parallel this major fault. A few fracture zones also strike northwest. The claims were prospected and several occurrences were sampled and assayed. A previous assay yielded 2.1 g/t Au.

(b) BONNEY ROAD Claim Gp. (473725) 21 H/5W

This 18-claim group is east of the Village of Nauwigewauk, about 25 km northeast of the City of Saint John. Heath Steele Mines Ltd. staked the ground between 1970-1972 to cover a Carboniferous limestone deposit. The area of economic interest was reduced to the present claim group as a result of a sampling programme conducted by this company. A mining license for the property was taken out by Amex Potash Ltd. and mining rights were transferred to J.D. Irving Ltd. in March 1979. More recently, the property was restaked, prospected and sampled by the present claim holder.

55. Kinbauri Gold Corp.

(a) ROACH CREEK Claim Gp. (473684) 21 G/1W

This claim group is at Little Lepreau about 35 km southwest of the City of Saint John, along the Bay of Fundy coast. The area is underlain by Late Precambrian mafic and felsic volcanic rocks that are thrust over Carboniferous siltstone, sandstone, and conglomerate. Effects of silicification, carbonatization, and epidotization associated with veins, fracture, and shear zones are most common in the volcanic sequence. Au, As, and Sb anomalies detected in humus overlie these altered rocks. The highest gold content found in the altered bedrock was 8 ppb Au. Another rock sample assaying 5 ppb Au was overlain by humus, which assayed 4 ppb Au.

(b) CHANCE HARBOUR Claim Gp. (473617) 21 G/1W

This claim group is 25 km southwest of the City of Saint John, along the Bay of Fundy coast. The area is underlain by Precambrian mafic and felsic volcanic rocks and granite, which are thrust over Carboniferous sandstone, mudstone, and conglomerate. The company mapped the geology and conducted a detailed humus and rock geochemical programme on the property.

56. William G. Walton

ACAMAC Claim Gp. (473704) 21 G/8E

Confidential until June 15, 1991. This 2-claim group is 10 km west of the City of Saint John. The claims cover part of a Precambrian dolomitic limestone prospect, which was formerly held by Ketepec Development Ltd. Mr. Walton mapped and prospected the ground and conducted a magnetometer survey.

57. **J.A.R. McIntyre**

TAYLOR ISLAND Claim Gp. (473610) 21 G/1E

This group of 15 claims is located about 3 km southwest of the City of Saint John. The island is underlain by sedimentary rocks of Carboniferous age. Prospecting and sampling (rock and beach sand) and VLF with EM-16 surveys were carried out.

58. **Glenvet Resources Limited**

GOLDEN GROVE Claim Gp. (473796) 21 H/5W

Confidential until December 13, 1991. This claim group is 10 km northeast of the City of Saint John. The property comprises several prominent fault slices composed of Precambrian mafic to felsic volcanic and sedimentary rocks, granite gneiss and gabbro. The company conducted airborne magnetic and VLF EM surveys on the property.

59. **Robert Baxter**

GOLDEN GROVE Claim Gp. (473723) 21 H/5W

Confidential until August 18, 1991. This 12-claim group is immediately southwest of Golden Grove Mountain within the city limits of Saint John. The claims were originally staked for their graphite and gold potential. The area is underlain by Precambrian limestone and dolomite, granite gneiss and mafic to felsic volcanic rocks. R. Baxter conducted lake-sediment and deep overburden geochemical sampling, and a VLF EM survey on the property.

60. **Neptune Resources Corp.**

MARIGOLD Claim Gp. (473665) 21 H/5W

This claim group is about 17 km east of the Saint John Airport. The area is underlain by intensely deformed and altered Precambrian felsic and mafic volcanic, sedimentary, and granitoid rocks. The property was staked in 1983 because of highly anomalous (27 to 274 ppb Au) stream-silt sampling analyses. The company subsequently conducted soil sampling, magnetic, VLF EM, and IP surveys on the property. Three soil anomalies were delineated with many samples assaying between 10 and 40 ppb Au and three yielded 2220, 188, and 109 ppb Au. Six holes were drilled to test the anomalies. One hole intersected two consecutive 1 m sections assaying 17.4 and 0.56 g/t Au.

61. **Mispec Resources Inc.**

(a) BALLS LAKE Claim Gp. (473651) 21 H/4W

Confidential until March 27, 1991. This claim group is about 10 km southeast of the City of Saint John. The area is underlain by intensely deformed Carboniferous sandstone, siltstone, and conglomerate. The ground was staked when anomalous amounts of gold were found. The company drilled eight holes that were subsequently logged and sampled by Derry Michener, Booth and Wall.

(b) CAPE SPENCER Claim Gp. (473752) 21 H/4W

Confidential until October 10, 1991. This claim group is about 12 km southeast of the City of Saint John, near the Bay of Fundy coast. The property is transected by several prominent thrust faults that juxtaposed Precambrian granite and granodiorite on Carboniferous or older sedimentary rocks. Several gold deposits and occurrences are associated with these faults. Gold occurs with pyrite and locally with minor base metal sulphides in prominent alteration haloes along these structures. Mispec conducted extensive till and soil geochemistry, induced polarization surveys, geologic mapping, and diamond drilling on the property.

62. **Kenora Gold Occurrences Inc.**

VERNON MINE Claim Gp. (473635) 21 H/11E

This claim group is 75 km northeast of the City of Saint John, along the Bay of Fundy. The property is underlain by Late Precambrian mafic and felsic volcanic and associated sedimentary rocks. The entire sequence is intruded by granodioritic and granitic intrusions. Gold was first reported from the Vernon mine by L.W. Bailey in 1864. Gossan overlying the Peacock Vein assayed 137 g/t Au. Copper was mined from an adit between 1860 and 1863. Since 1983, Mactaquac Mining Ltd. conducted exploration on the property, funded by U.S. Borax Inc., who had optioned the property. This company conducted soil geochemical and VLF EM surveys, and some trenching was done on the property. In recent years Kenora prospected the ground and found a new occurrence in the upper end of Rose Brook. Grab samples from the occurrence assayed up to 9080 ppm Cu and 1274 ppb Au in a metre-thick, silicified zone. A soil sample taken 300 m along strike assayed 188 ppm Cu. An IP survey was carried out over the Rose Brook occurrence, but this was not successful.

63. **PGE Resource Corp. and Corona Corporation**

MECHANIC SETTLEMENT Claim Gp. (473739, 473789) 21 H/11W

Confidential until September 12, 1991 and December 6, 1991, respectively. This 77-claim group is about 20 km east of the Town of Sussex. The property is centered around an extensive northeast-striking Precambrian mafic-ultramafic intrusive complex, which locally contains significant concentrations of platinum-group elements. The intrusive complex was first delineated in a geological mapping programme of the Caledonia Highlands conducted by the Geological Surveys Branch. The complex and associated platinum-group element mineralization was more recently investigated in more detail by A.D. Paktunc of the Geological Survey of Canada. The property was first explored for metallic minerals by Canex Aerial Exploration Ltd. in 1970, which resulted in the discovery of several chalcopyrite occurrences and a number of Cu-Ni soil anomalies. Corona Corporation optioned the claim group from PGE Resource Corp. Corona prospected the ground, mapped the geology, and conducted a deep overburden geochemical sampling programme utilizing a motorized auger. A standard B-horizon soil geochemical survey was also conducted.

MONCTON-CUMBERLAND BASIN

64. SKW Canada Inc.

SUSSEX SILICA Claim Gp. (473614) 21 H/12E

The Sussex silica deposit is located at Poodiac, 15 km south of Sussex. A 5.4 km grid was prepared and a hammer seismic survey was carried out. The survey was not adequate to determine the boundaries of the deposit.

65. James Colucci

JORDAN MOUNTAIN Claim Gp. (473737) 21 H/14W

This 10-claim group is about 10 km north of the Town of Sussex. In the area, Precambrian rhyolite and unconformably overlying Carboniferous conglomerate, sandstone, and siltone constitute part of a basement high (Kingston Uplift). The property contains several chalcocite-malachite showings that occur along a prominent fracture zone in the Precambrian rhyolite. Manganese occurrences are locally exposed in Carboniferous strata south of the copper occurrences. Two holes were drilled in the property, but no significant amounts of metallic minerals were found.

66. Lafarge Canada Inc.

SPRINGHILL Claim Gp. (473734) 21 I/3W

The 18-claim Springhill claim group is 5 km northwest of the Village of Havelock, the lime products manufacturing centre of southeastern New Brunswick. The area is underlain by Carboniferous limestone, which overlies red sandstone, conglomerate, and shale. The company conducted magnetometer and VLF EM surveys on the property to delineate the stratigraphic and fault contacts of the limestone deposit. The VLF EM proved to be useful in geologic interpretation, but no discernible geologically meaningful magnetic anomalies could be delineated.

67. Dickenson Mines Ltd.

HICKSVILLE Claim Gp. (473751) 21 I/3W

This 18-claim group is about 6 km northeast of the company's Samphill quarry near Havelock. The area is underlain by Carboniferous limestone which overlies red sandstone, conglomerate, and shale. An extensive diamond-drilling programme was carried out by the company on the claim group, which delineated a high-grade limestone deposit. Based upon this drilling, the high-calcium limestone reserve at Hicksville is 1 772 496 t at a stripping ratio of 0.45:1. An additional 559 939 t at 1.40:1, giving a total of 2 372 435 t at 0.69:1.

CARBONIFEROUS PLATFORM

11. Sharpe Energy and Resources Limited

(c) BRUCE SIDING Claim Gp. (473803) 21 P/5E

This group of 39 claims is located about 10 km south of Bathurst. A road that trends southwest from the Rough Waters road and crosses Red Pine Brook provides access to the property. Work on the property included linecutting, diamond drilling (3 holes totalling 464.85 m), and geophysical surveys (magnetometer, Max-Min, and gravity).

61. Mispec Resources Inc.

(c) SHIN CREEK Claim Gp. (473756) 21 G/10E

Confidential until October 24, 1991. The Shin Creek 85-claim group is southwest of the Village of West Mill Settlement along the southeast margin of the Carboniferous Mount Pleasant Caldera. In 1975, the property was optioned by Rio Tinto Canada Ltd. as a uranium prospect. In 1978 and 1979 twelve holes were drilled. One of the 1979 holes intersected intensely silicified and pyritized quartz-feldspar porphyry similar to the typical mineralized zones at Mount Pleasant. One assay from this section assayed 0.26% Mo and 16.5 g/t Ag, but, unfortunately, this hole was accidently dumped. As a result of this discovery, Billiton Canada Ltd. optioned the property and conducted a geochemical and geophysical exploration programme for Sn, W, Mo, and Bi and five short holes were drilled. These holes failed to intersect the silicified porphyry and breccia found in 1979. More recently H.C. McNamara drilled another hole in the vicinity of the 1979 mineralized intersection.

68. Atlantic Orebodies Inc.

(a) Renous River area - exploration permit (473669) 21 I/13W

Carboniferous formations were examined for metallic minerals and evaporites. Two drill holes, 599 m and 517 m deep, intersected sandstone and shale that is disconformably underlain by mainly red fanglomerates, clacareous shales and sandstones. A thin coal seam and a 2 m lignite bed were intersected in one of the holes. Pyrite was also present.

(b) Newcastle area - exploration permit (473670) 21 P/4E

An exploration reservation in the Miramichi River valley was investigated. Work included inspection of outcrops (Pictou Group sandstones and grit), analysis of water from an artesian salt well at Russellville, and drilling of a 1040 m hole at Newcastle.

The report concludes that the aeromagnetic anomaly is caused by basaltic volcanics; the gravity low was not explained. The existence of the Miramichi graben was evident from the intersection of 985 m of sedimentary rocks.

69. **Cecil Smyth**

CECIL SMYTH Claim Gp. (473677) 21 P/12E

This 9-claim group is located 3 km south of Bathurst on the east side of the Pabineau River. Work on the group (conducted in 1977) included assaying of 5 rock samples. Highest values obtained were from Pb-Zn-bearing float: 0.25% Cu, 5.15% Pb, 15.5% Zn, 0.08 g/t Au, 3.55 g/t Ag. Trenching was done but no bedrock was found because of thick overburden.

METALLIC MINERAL DEPOSITS

Halfmile Lake Zinc, Lead, Silver, Copper 21 O/8W

In 1989, Falconbridge Limited controlled the Kidd Creek Mines Ltd. part of the Halfmile Lake deposit (Upper AB Zone), while Noranda Exploration Company, Limited controlled the Conwest part (Lower AB Zone) and Mattagami Lake Exploration Limited controlled the Main Zone.

The Halfmile Lake deposit (Figure 17) consists of one continuous horizon that is locally repeated by folding and faulting. The known strike length of the Halfmile Lake horizon is approximately 3 km to a depth of 975 m. The three zones (Upper AB, Lower AB, and Main) all contain variable amounts of sphalerite, galena, and chalcopyrite. Stratigraphic evidence indicates the sequence has been overturned, with the stringer zone occurring above the massive sulphides.

According to company reports, reserves are: 2 100 000 t grading 6.55% Zn, 2.26% Pb, 0.45% Cu, 37 g/t Ag for the Upper AB Zone; 6 000 000 t grading 10.26% Zn, 3.3% Pb, 0.08% Cu, 28 g/t Ag for the Conwest portion of the deposit; and 1 088 600 t grading 4.63% Zn, 0.87% Pb, 0.46% Cu, 8.9 g/t Ag for the Main Zone.

Between 1987 and 1989 deep drilling has been carried out by Noranda Exploration Company, Limited and Brunswick Mining and Smelting Corporation Limited.

Millican Lake Gold 21 H/4

The Millican Lake gold property is located 15 km east of the City of Saint John. It extends from the Cape Spencer deposit northeast to Millican Lake (Figure 17). Mineral rights to the property are owned by Mispec Resources Inc. (see p. 87).

Results of diamond drilling in the Birches Zone of the Cape Spencer claim group were announced by the company in 1989. One drill hole intersected 4.01 g/t Au over 4 m, which included 9.46 g/t over 1 m. Another drill hole yielded results of 3.4 g/t Au over 9 m, which included 5.31 g/t over 4 m, 17.90 g/t Au over 1 m, and 13.47 g/t Au over 1 m. Previous drilling in the Road Zone, which constitutes the extension of the Gordex

Minerals Limited ore zone, intersected 8.50 g/t Au over 5.5 m. The auriferous zones in the Cape Spencer area are related to extensive Hercynian thrust faults, which emplaced Precambrian granitoid rocks onto Carboniferous or older sedimentary rocks.

Mount Pleasant Tungsten, Molybdenum 21 G/7W

LOCATION The Mount Pleasant property is about 50 km northeast of St. Stephen, Charlotte County (Figure 17).

RIGHTS Mining Lease 1255, held by Billiton Metals Canada Inc., was restaked in 1989. As a result, LAC Minerals Limited now holds 4 claims covering the mine area, and LAC Minerals Limited and Billiton Metals Canada Inc. jointly hold 98 claims surrounding the mine area, under the Mining Act, Chapter M-14.1, S.N.B. 1985.

COMPANY The LAC/Billiton tin project is operated by LAC Minerals Ltd. with head offices at 2105 N. Tower, P.O. Box 156, Royal Bank Plaza, Toronto M5J 2J4. Mine Office address is P.O. Box 150, St. George, New Brunswick E0G 2Y0. The President and Chief Executive Officer is P. Allen, the Manager is R. Young, and the Resident Geologist is G. Kooiman.

HISTORY A group called Geochemical Associates staked Mount Pleasant in 1954 for Selco Exploration Ltd. Selco drilled four holes in a geochemical anomaly, but no metallic minerals of interest were intersected and the property was returned to Geochemical Associates.

In 1956, Kennco Exploration (Canada) Limited optioned the property and drilled ten holes, but the results were disappointing and Kennco dropped the option. Mount Pleasant Mines Ltd. staked the ground in 1959. Kennco optioned the property again and drilled several holes that intersected tungsten, molybdenum and tin minerals, but the option was dropped again because the mineralized zone could not be followed.

In 1960, a trenching and diamond-drilling programme combined with a detailed geological investigation by the Mount Pleasant Mines geological staff led to the discovery of a tin-base-metal ore zone in the northern part of the property. This ore zone is commonly referred to as the North Zone deposit. Deep drill holes also intersected tungsten-molybdenum ores in the northern part of the property (North Zone) and in the Fire Tower Zone (Mount Pleasant), but lack of sufficient funds prevented systematic drilling of these deeper ore zones. The delineation of the complex geology of the property guided subsequent exploration by Sullico Mines Ltd. This company optioned the property in 1967. Drilling by Sullico and later its wholly-owned subsidiary Brunswick Tin Mines Limited led to the delineation of the tungsten-molybdenum ore zones in the Fire Tower Zone and the North Zone.

In 1977, Billiton Canada Limited and Brunswick Tin Mines Limited made a joint venture agreement to bring the Fire Tower Zone's tungsten-molybdenum orebody (Fire Tower Zone West) into production. Mill construction and underground work were completed in 1983 when the first

concentrates were produced. Commercial production started in 1984. The mine operated until July 31, 1985, when it was forced to close as a result of very poor tungsten and metal prices.

On October 1, 1985, LAC Minerals entered a 50/50 joint venture agreement with Billiton to explore and possibly develop the North Zone tin deposit, located 1 km north of the present mine site. Since October 15, 1985, LAC Minerals has completed 2100 m of underground development to provide drill access to areas of the deposit where additional information was required. To the end of December, 1987, 18 124 m of underground drilling and 3364 m of surface drilling have been completed. Two bulk samples from underground totalling 2652 t were processed at the site and sent off for metallurgical analysis.

The feasibility study regarding the mining and processing of tin from the site was completed in late 1987, and was reviewed in 1988. The company decided not to proceed at this time due to the depressed state of the price of tin. During 1988, an evaluation programme was also carried out to explore for other mineral occurrences on the property.

RESERVES: (Published) Reserves for the Fire Tower Zone are 12 220 000 t of ore grading 0.38% WO_3 and 0.2% MoS_2. The North Zone reserves are 5 900 000 t grading 0.79% Sn.

PRODUCTION There has been no production since 1985 and none is planned.

DEVELOPMENTS In November of 1989, NovaGold Resources Inc. announced the signing of a letter of intent to acquire the Mount Pleasant tin-tungsten mine from Lac Minerals Limited and Billiton Metals Canada Inc. The company will conduct extensive metallurgical studies of the ores and diamond drilling to define areas with additional potential.

EMPLOYEES During 1989, security staff were on site.

NONMETALLIC MINERALS

During 1989, nonmetallic mineral exploration in the Province included activities associated with dolomite occurrences in Saint John County, limestone resources in Westmorland County, and gypsum in the Hillsborough area. In addition, aggregate and decorative building stone resources were actively being investigated in Charlotte and Westmorland counties.

BP Resources Canada Ltd. (Mining Division) has not announced a decision to proceed with underground exploration of the Millstream potash property, 10 km west of Sussex.

Four applications for Peat Exploration Licences were under review in 1989: Lemèque Quality Group Ltd. (Bog 25); Tourbière St-André Inc. (Bog 301); Good Earth Canada Ltd. (Bog 16); and Acadian Peat Moss (1979) Ltd. (Bog 301).

Applications for Bogs 301 (Tourbière St-André Inc.) and Bog 16 have been rejected. A Privileged Option has been granted to Acadian Peat Moss (1979) Ltd. for Bog 301.

PEAT

Berger Mix Inc.

COMPANY Berger Mix Inc., 121, R.R. #1, St-Modeste, Québec, GOL 3WO. The contact person is Yves Gauthier. Telephone (418) 862-4462.

RIGHTS Peat Exploration Licence 88-3 (186 ha) on Bog 354, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 354 is located 35 km southwest of Bay du Vin (Figure 17). Access is by Bay du Vin road and a logging road.

HISTORY Berger Mix Inc. applied for and received a Peat Exploration Licence in 1988. The project was screened out under EIA regulation in 1989.

RESERVES AND GRADE 10.29 Mm^3 surficial peat and 1.82 Mm^3 humified peat on a total bog area as follows:

	Bog (total)	>1 m
Crown (ha)	186	146
Freehold (ha)	286	151
Total (ha)	472	297

Entreprises Premier CDN Ltée

COMPANY Entreprises Premier CDN Ltée, 454 Chemin Témiscouata, C.P. 2600, Rivière-du-Loup, Québec, G5R 4C9. The contact person is George Gagnon. Telephone (418) 882-0735.

RIGHTS Peat Exploration Licence 88-2 (578 ha) on Bog 389, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 389 is located 17 km west of Minto. Access is by a logging road off route 10 (Figure 17).

HISTORY Entreprises Premier CDN Ltée applied for a Peat Exploration Licence in 1987. A licence was issued in 1988. Survey of the proposed lease area was done in 1989.

RESERVES AND GRADE 7.38 Mm^3 surficial peat and 3.75 Mm^3 humified peat on a total bog area as follows:

	Bog (total)	>1 m
Crown (ha)	578	341
Freehold (ha)	57	0
Total (ha)	635	341

Fafard Peat Moss Co. Ltd.

COMPANY Fafard Peat Moss Co. Ltd., P.O. Box 70, Shippagan, Gloucester County, New Brunswick. Telephone (506) 336-2325. The Manager is René Martin.

RIGHTS Peat Exploration Licence 88-1 (410 ha) on Bog 552, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 552 is located 6 km southwest of Black Rock. Access is by dirt road off route 635 (Figure 17).

HISTORY Fafard Peat Moss Co. Ltd. applied for and received a Peat Exploration Licence in 1988.

RESERVES AND GRADE 9.78 Mm^3 surficial peat and 5.13 Mm^3 humified peat on a total bog area as follows:

	Bog (total)	>1 m
Crown (ha)	410	353
Freehold (ha)	0	0
Total (ha)	410	353

Satoturve Oy

COMPANY Satoturve Oy SF-27130, Eurajoki As, Finland. The contact person is Mikko Voutilainen. Telephone: (938) 80 600.

RIGHTS Peat Exploration Licence 87-2 (1213 ha) on Bog 324N, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 324N is located 3 km south of Escuminac. Access to the bog is by logging roads off Highway 117 (Figure 17).

HISTORY Satoturve Oy applied for a Peat Exploration Licence in 1985. A licence was granted in 1987.

RESERVES AND GRADE 30.21 Mm^3 surficial peat and 8.74 Mm^3 humified peat on a total bog area as follows:

	Bog (total)	>1 m
Crown (ha)	1213	927
Freehold (ha)	62	47
Total (ha)	1275	974

ENERGY RESOURCES

OIL SHALE

Cartago Resources Ltd. 21 H/15E

COMPANY Cartago Resources Ltd., 304 - 2466 West 3rd Avenue, Vancouver, British Columbia V6K 1L8. Telephone: (604) 732-1958. The President is Walter W. Storm and the Manager is Jessica Leeder.

RIGHTS Bituminous Shale Licence to Search L85-01 comprises 8998 ha. The licence is issued under the Bituminous Shale Act, Chapter B-4.1, R.S.N.B. 1976.

LOCATION Licence to Search L85-01 occupies an approximately rectangular area in Westmorland County between the Petitcodiac and the Memramcook rivers. The area includes the villages of Belliveau, Dover, Memramcook, Saint-Joseph, and Taylor Village (Figure 17).

HISTORY Oil shales have been known in the Westmorland County area for more than 100 years. In 1942, the Canada Department of Mines and Resources drilled seven core holes at Taylor Village totalling 320 m. In 1967 and 1968, the Atlantic Richfield Company drilled five exploratory oil shale holes in the Dover, Saint-Joseph, and Taylor Village areas.

The area was held under a Bituminous Shale Licence to Search by Canadian Occidental Petroleum from 1974 to 1981. They carried out an oil shale mapping survey and reported assay work on numerous surface samples.

Petro-Canada held a Bituminous Shale Licence to Search in the Westmorland County area from 1981 to 1984. They drilled 963 m of core in three holes in the Dover and Boudreau Village areas.

EXPLORATION In 1985, sampling and assay work were undertaken on the Petro-Canada core. In 1986, a shallow drill hole (106 m) was put down in the Dover area. Trenching and assay work in 1987 confirmed the surface location of a high-grade oil shale zone on the licence.

DEVELOPMENTS The licence to search was surrended on March 15, 1989.

OIL AND NATURAL GAS

Pembina Resources Limited 21 H/15

COMPANY Pembina Resources Limited, P.O. Box 1948, 734-7th Avenue S.W., Calgary, Alberta T2P 2M7.

RIGHTS ONG lse/on-sh 88-1, 88-2, and 88-3 (11 134.8 ha) under the Oil and Natural Gas Act, Chapter O-2.1 R.S.N.B. 1976

LOCATION ONG lse/on-sh 88-1 to 88-3 inclusive are located approximately 15 km south and southeast of Moncton (Figure 17).

HISTORY Effective January 1, 1989, Pembina Resources Limited and Western Decalta Petroleum (1977) Limited amalgamated, retaining the above company name and address.

OUTLOOK All three leases are in good standing.

Pembina Resources Limited 21 H/15
Chevron Canada Resources Limited
Irving Oil Limited

COMPANY Pembina Resources Limited, P.O. Box 1948, 734-7th Avenue S.W., Calgary, Alberta T2P 2M7. Chevron Canada Resources Limited, 500-5th Avenue S.W., Calgary, Alberta T2P 0L7. Irving Oil Limited, P.O. Box 1421, Saint John, New Brunswick E2L 4K1.

RIGHTS ONG lic/on-sh 83-4 and 83-5 (66 072 ha) under the Oil and Natural Gas Act, Chapter O-2.1 R.S.N.B. 1976

LOCATION ONG lic/on-sh 83-4 is located 15 km north of Moncton; ONG lic/on-sh 83-5 is located 25 km northwest of Moncton (Figure 17).

HISTORY Effective January 1, 1989, Pembina Resources Limited and Western Decalta Petroleum (1977) Limited amalgamated, retaining the above company name and address. As administrator of the licences, Pembina Resources Limited allowed the same to expire October 23, 1989.

CHAPTER 3. MINE DEVELOPMENT IN NEW BRUNSWICK

METALLIC MINERALS

In 1989, mine development continued at a steady rate. Marshall Minerals Corp. and Stratabound Minerals Corp. are proceeding toward development of their base metal deposits. Burnt Church Peat Moss Co. Ltd. (peat), Elmtree Resources Ltd. (dolomite), and Canadian Occidential Petroleum Limited (oil shale) were also developing deposits during the year.

Marshall Minerals Corp. (Restigouche) 21 O/7, 10

LOCATION The Restigouche zinc, lead, silver, copper deposit is located on the Road to Resources, about 70 km west of Bathurst in Restigouche County (Figure 18). (Lat. 47°30.2'N; Long. 66°33.5'W)

RIGHTS In 1989, Marshall Minerals Corp. converted Mining Licences 1237 and 1302 into claims, and regrouped these and others into a 273-claim block under the Mining Act, Chapter M-14.1, S.N.B. 1985.

COMPANY Marshall Minerals Corp. The head office is 4776 Bridge St., P.O. Box 356, Niagara Falls, Ontario L2E 6T8. The Chairman is H.G. Quint and the President is N. Brewster.

HISTORY The property was initially staked by Selco in 1954 because of strong base-metal anomalies in streams draining the area. In 1957 the property was optioned to New Jersey Zinc Company who discovered the sulphide deposit by drilling a strong soil-geochemical anomaly. Tech Corporation (Keevil Mining Group) optioned the property in 1965. After several drill holes and metallurgical tests, Tech dropped its option in 1970. In 1972, the property was optioned to Gowganda Silver Mines who turned over its interest to Placer Development in 1974. In 1980, Placer optioned this deposit to Billiton who completed 11 278 m of drilling and then dropped it in 1983. Extensive geological, geophysical, and geochemical studies were carried out and the extensive drilling added 90 720 t to the ore reserves. In 1985, Lincoln Resources optioned the property. The property was optioned by Southwind Resources in 1986. Marshall Minerals acquired the rights to the property from Placer-Dome Inc. in 1988.

GEOLOGY The host rock is Ordovician sericite-chlorite and chlorite-sericite schist that overlies interbedded metaquartzite and metagreywacke. Conformable lenses of banded, massive to disseminated, fine-grained pyrite-sphalerite-galena-chalcopyrite-minor tetrahedrite plunge approximately 17° to the north-northwest. This zone is 490 m long and averages 90 m wide and 30 m thick. Mineralization outcrops to the south and

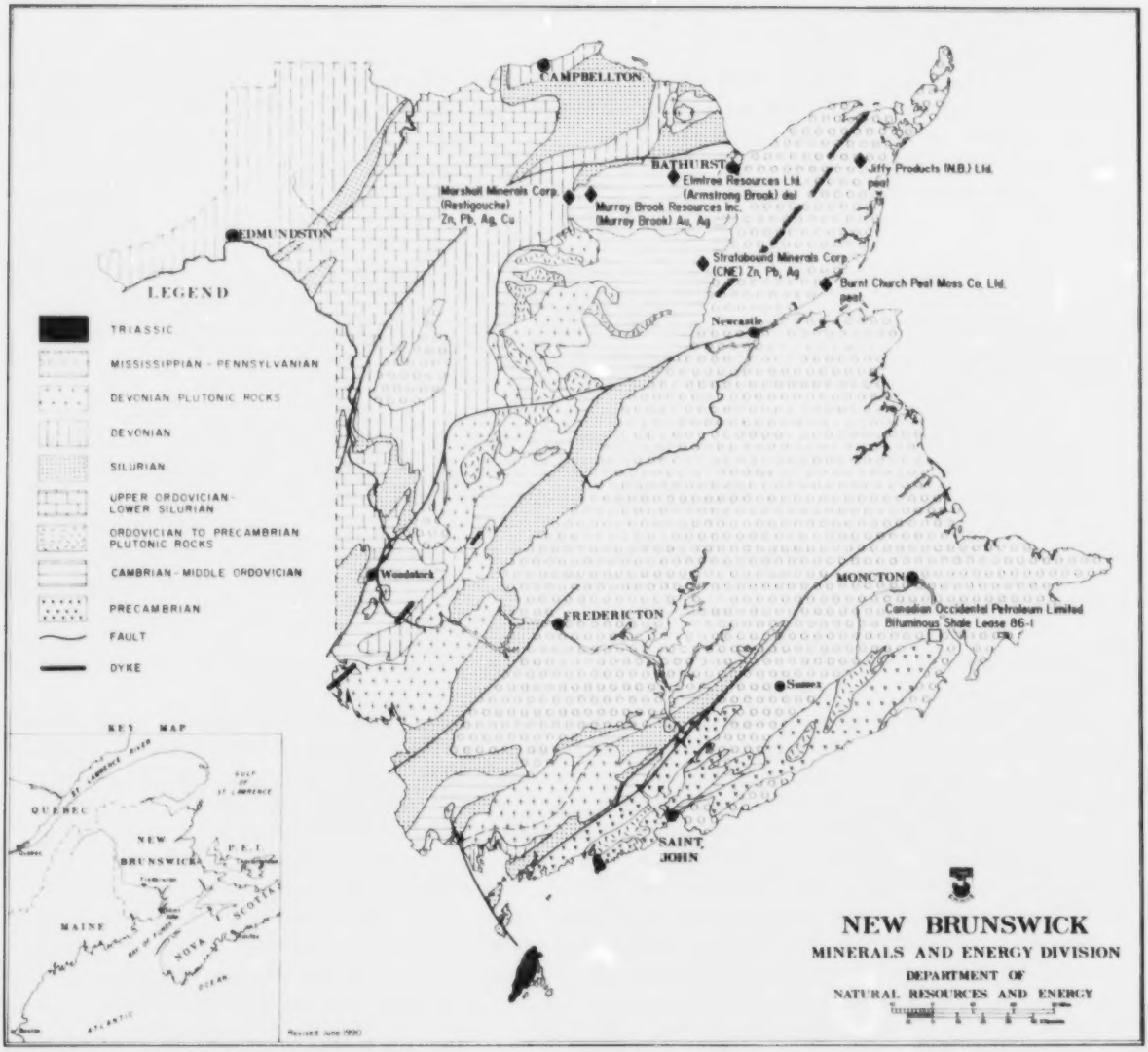


Figure 18. Mine properties in development stage in New Brunswick in 1989.

has been traced to a vertical depth of 183 m to the north. Minor folds are common, and the host rock is chloritized adjacent to the mineralization.

RESERVES Marshall Minerals Corp. reported total reserves of 1 730 000 t grading 0.35% Cu, 5.36% Pb, 6.94% Zn, 112.1 g/t Ag, and 1.2 g/t Au. This includes 1 150 000 t of open-pit reserves grading 0.38% Cu, 5.96% Pb, 7.71% Zn, 124.1 g/t Ag, and 1.37 g/t Au using a 6% combined lead-zinc cutoff.

DEVELOPMENTS After acquiring the mineral rights to the Restigouche deposit in March of 1988, Marshall Minerals Corp. embarked on an extensive drilling programme to further define reserves and processibility of the ore. Results proved favourable and in February, 1989, Marshall registered for screening under the Province's Environmental Impact Assessment (EIA) Regulation. The project was screened in because the deposit is situated on Charlotte Brook, which runs into Upsalquitch Lake, a well known sport fishing area in a relatively undisturbed part of the Province. Marshall is currently compiling its EIA report for the project and hopes to receive a positive response from the Lieutenant Governor-in-Council during the first quarter of 1990.

The deposit is not large enough to support a mill; however, the company has entered into an agreement with East West Caribou Mining Limited to process the Restigouche ore. This agreement is contingent upon the results of a bulk sample test, which will be processed at the Caribou site. The bulk sample will be extracted once the decision on their EIA has been made. It is expected that approximately $3 000 000 will be needed to bring the property into production. This would bring Marshall's total costs up to $5 000 000. It is anticipated that production would run at about 750 t/d from an open pit operation, employing 25 people for a period of eight years.

Stratabound Minerals Corp. (CNE) 21 O/8W

LOCATION The Captain North Extension (CNE) zinc, lead, silver deposit is 14 km east of the Heath Steele mine, just east of the Northumberland-Gloucester county line and about 1.5 km north-northwest of the Captain deposit (Figure 18). (Lat. 47°17.7' and Long. 65°53.2') It is accessible via Hwy. 430 and secondary roads.

RIGHTS Norman Pitre of Bathurst, N.B., holds 17 mineral claims under the Mining Act, Chapter M-14.1, S.N.B. 1985. Stratabound Minerals Corp. has a 100% working interest in the property, subject to a 19% net smelter royalty.

COMPANY Stratabound Minerals Corp. The head office is at Suite 518, Tri Ocean Place, 222-58th Ave. SW, Calgary, Alberta T2H 2S3. Mr. S.J. Stricker is president and Mr. K.D.A. Whaley is vice-president in charge of exploration.

HISTORY The CNE deposit was found by Sabina Industries in 1978 as a result of stream-silt and soil (organic) geochemical surveys. Sixteen

holes were drilled but only two intersected significant lead-zinc mineralization. The property was dropped in 1983 and acquired by Billiton but they did no further drilling. In 1986 the property was staked by N. Pitre who optioned it to Noranda Exploration the following year. After drilling nine holes in 1987 and two in 1988, Noranda concluded that the CNE deposit was too small to warrant further investigation. In December, 1987, Stratabound Minerals Corp. obtained the mineral rights to the CNE deposit.

GEOLOGY The CNE deposit is situated within a northerly trending sequence of sedimentary and felsic volcanic rocks that comprise part of the Ordovician Tetagouche Group. Lithologically, these rocks are very similar to those in the vicinity of the Brunswick massive sulphide deposits, i.e., siltstones, quartz augen schists, quartz-feldspar augen schists, and massive rhyolites.

According to Whaley (Stratabound Minerals Corp. Annual Report, 1989), the massive sulphides occur in five lenses at surface. The lenses have a northerly strike and a vertical to west 70° dip. The proven reserves are in lenses 2 and 3. The sulphides are coarse grained and composed dominantly of sphalerite, pyrite and galena with minor arsenopyrite and trace amounts of chalcopyrite, cassiterite, and argentiferous tetrahedrite.

RESERVES Drill-indicated reserves, using a cut-off grade of 6% combined lead and zinc, are 425 000 t grading 5.59% Zn, 2.00% Pb, and 67.9 g/t Ag plus another 43 770 t of additional ore grading 1.42% Cu and 0.68 g/t Au (Stratabound Minerals Corp. Annual Report for 1989).

DEVELOPMENTS Trenching of an IP target in October, 1988, followed by drilling in late 1988 (14 holes) and early 1989 (10 holes) resulted in the delineation of an open-pittable reserve of massive sulphides. During the summer, 17 km of bush road into the site was upgraded and/or constructed; the site was cleared and a 35 m x 15 m trench was excavated in preparation for bulk sampling.

Initial bench-scale metallurgical tests were conducted on 200 kg of drill core at the Brunswick mill and at the Caribou mill. The results indicate recoveries of 90.3% Zn, 81.0% Pb, and 86.0% Ag. Based on these results, Stratabound registered the project under the Environmental Impact Assessment Regulation and the project was subsequently screened out with conditions. Following the positive EIA screening decision, Stratabound applied to the Department of Natural Resources and Energy to remove a 12 000 t bulk sample to test the metallurgy of the ore in a local mill. A preliminary feasibility study and a pit design were completed and, during the latter part of the year, additional drilling (26 holes) was done to test the down-plunge continuity of the orebody.

The removal of the bulk sample, tentatively scheduled for 1990, will be followed by a production decision. As the deposit is of relatively low tonnage, the company anticipates processing the ore at one of the local mills at a rate of approximately 500 t/d.

NONMETALLIC MINERALS

PEAT

One peat moss company was in a development stage in 1989: Burnt Church Peat Moss Co. Ltd. Another company, Jiffy Products (N.B.) Ltd. was granted a Peat Lease early in 1989 (Figure 18).

Burnt Church Peat Moss Co. Ltd.

COMPANY Burnt Church Peat Moss Co. Ltd., P.O. Box 70, Shippagan, New Brunswick E0B 2P0. Telephone: (506) 336-2325. The contact person is René Martin.

RIGHTS Peat Moss Lease No. 22 (202 ha) on Bog 353, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 353 is located 3 km southwest of Burnt Church, Northumberland County (Figure 18).

HISTORY The company acquired a Peat Exploration Licence in 1981 and converted to a Peat Moss Lease in 1983. Fafard Peat Moss Co. Ltd. acquired the assets of the company in 1988. In 1989, the project was screened out under EIA regulation.

RESERVES AND GRADE 9.26 Mm^3 of surficial peat and 1.06 Mm^3 of humified peat on total bog area as follows:

	Bog (total)	>1 m
Crown (ha)	90	67
Freehold (ha)	237	188
Total (ha)	327	255

DEVELOPMENT Exploration and resource evaluation.

Jiffy Products (N.B.) Ltd.

COMPANY Jiffy Products (N.B.) Ltd., P.O. Box 360, Shippagan, N.B. E0B 2P0. The manager is Alonzo Dupuis. Telephone: (506) 336-2284.

RIGHTS Peat Moss Lease No. 32 (268 ha) on Bog 536 under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 536 is located 8 km north of Tracadie, between Pont-Landry and Ste-Rose. Access is by dirt road off Highway 11 (Figure 18).

HISTORY Jiffy Products (N.B.) Ltd. established a peat pot and pellet manufacturing plant in Shippagan in 1975. In 1982, the company was issued a Peat Exploration Licence for Bog 536. A Peat Moss Lease was granted in 1989 to guarantee a long-term supply of quality peat moss for the manufacturing plant.

RESERVES AND GRADE 5.64 Mm^3 surficial peat and 8.74 Mm^3 humified peat on a total bog area as follows:

	Bog (total)	>1 m
Crown (ha)	218	201
Freehold (ha)	47	19
Total (ha)	265	220

DEVELOPMENT Resource evaluation.

DOLOMITE

Elmtree Resources Ltd. (Armstrong Brook) 21 P/12W

COMPANY Elmtree Resources Ltd., P.O. Box 665, Bathurst, New Brunswick E2A 3Z6. Telephone: (506) 546-6382. The Executive Officer and President is A. Buzas, and the Manager and Vice-President is G.M. Doucet.

RIGHTS 59.10 ha Quarry Lease No. 26 under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

161.1 ha Mining Lease No. 247, under the Mining Act, Chapter M-14.1, S.N.B. 1985.

LOCATION This dolomite deposit is located about 22 km west of Bathurst, Gloucester County (Figure 18).

HISTORY The deposit was found several years, perhaps decades, ago. It appears to have been used by local farmers, since the ruins of old kilns are present in the area. The deposit was rediscovered by Anaconda geologists in the 1950s while exploring for sulphide deposits. It was briefly investigated by J.W. McCarthy in the early 1970s and staked by Elmtree Resources Ltd. in 1982. An access road was constructed in 1983 and limited production for testing purposes was undertaken.

PRESENT OWNERSHIP Elmtree Resources Ltd.

RESERVES AND GRADE Exploration and development work by Elmtree Resources Ltd. has resulted in the delineation of more than 2 000 000 t of dolomite grading up to 37% $MgCO_3$.

PRODUCTION None.

DEVELOPMENT Plans to install additional crushing equipment for production of dolomitic ag lime and construction stone have been delayed.

EMPLOYEES Manpower was provided by staff of Elmtree Resources Ltd.

ENERGY RESOURCES

OIL SHALE

Canadian Occidental Petroleum Limited 21 H/15E

COMPANY Canadian Occidental Petroleum Limited, 1500, 635-8th Avenue S.W., Calgary, Alberta T2P 3Z1. Telephone: (403) 234-6700. The President is J. Angus McKee and the General Manager (oil shales) is E. Yildirim.

RIGHTS The company retains a 1439 ha Bituminous Shale Lease 86-1 under the Bituminous Shale Act, Chapter B-4.1, R.S.N.B. 1976.

LOCATION The lease area lies in the Albert Mines area about 25 km south-southeast of Moncton in Albert County (Figure 18).

HISTORY Bituminous shale was first reported at Albert Mines by Dr. Abraham Gesner in 1841. The area is best known for the solid hydrocarbon (albertite) vein that was discovered there by John Duffy in 1849. The vein was mined out between 1852 and 1880.

The importance of the oil shales first gained attention between 1854 and 1856 when Dr. Gesner retorted a burning oil from them. Following the closure of the albertite mine in 1880, the area attracted little detailed interest until 1942 when the Canada Department of Mines drilled 36 shallow core holes near the old mine. In 1968, the Atlantic Richfield Company Limited drilled two holes at Albert Mines. One of these holes assayed 63 litres of shale oil per tonne over 130 m.

PRESENT OWNERSHIP Canadian Occidental Petroleum Limited is a public company, with 48% ownership by Occidental Petroleum Limited and 52% by shareholders.

RESERVES AND GRADES In 1942, the Canada Department of Mines estimated that there were 90 900 000 t of oil shale averaging 44 L/t, yielding about 47 700 m^3 (300,000 barrels) of shale oil to a depth of 120 m. In 1982, the Geological Survey of Canada and the New Brunswick Department of Natural Resources estimated that there were about 42 925 000 m^3 (270,000,000 barrels) of oil in situ to a depth of 600 m.

EXPLORATION In 1974, Canadian Occidental Petroleum Limited acquired the rights to the Albert Mines area by means of a Bituminous Shale Licence to Search covering 404 700 ha in southeastern New Brunswick. They converted this licence in 1981 to a development permit of about 29 138 ha.

Between 1974 and 1981 nine core holes were drilled and a high-grade oil shale zone was partially delineated. In 1983, the permit area was reduced to 1439 ha. In 1986, the development permit was converted to a Bituminous Shale Lease.

In 1986, Canadian Occidental completed a resource evaluation study which began in 1984. This evaluation provided the basis for a mine evaluation plan for the Albert Mines site. A general plan for large-scale mining and a plan for excavating 40 000 to 50 000 t of shale from a small test pit have been submitted. The test pit sample was provided to the New Brunswick Electric Power Commission to run in their Chatham circulating fluidized-bed cocombustion demonstration plant in 1986.

In the past, Canadian Occidental has provided several tonnes of oil shale to Umatac Industrial Processes of Alberta, Lurgi GmbH of Germany, Petroleo Brasileiro S.A. of Brazil and the New Brunswick Electric Power Commission. The samples provide data on retorting and fluidized-bed combustion characteristics of Albert Mines oil shale.

DEVELOPMENTS In 1989, a sample of oil shale from the lease was co-combusted with New Brunswick coal at the New Brunswick Electric Power Commission 20 Mw circulating fluidized bed (CFB) demonstration plant in Chatham. Work was also initiated on the preliminary economics of commercial-scale oil shale/coal CFB combustors and a stand-alone oil shale retort.

CHAPTER 4. PRODUCING MINES AND QUARRIES IN NEW BRUNSWICK

VALUE OF PRODUCTION

The value of minerals produced in the Province of New Brunswick for 1989 compared favourably with 1988's record-breaking performance (Table 2, Figure 19). Total value for the year was $909 547 000, down marginally from the 1988 final figure of $910 803 000 (Table 3). Although the value of production compared well with that of the previous year, the industry did not achieve the potential that was indicated at the beginning of the year. Average base metal prices for 1989 were at their highest levels in recent years and this was expected to translate into another record-breaking performance for New Brunswick's mining industry. However, a series of unanticipated events prevented this milestone from being achieved.

Brunswick Mining and Smelting Corporation Limited experienced production problems during the last half of the year at New Brunswick's largest base metal mine, which resulted in a significant decline in revenue. There was also a loss of revenue from New Brunswick's newest base metal producer, East West Caribou Mining Limited. In July, a serious cash flow imbalance resulted in the temporary shutdown of the operation for the remainder of the year. Production from the revived Heath Steele mine commenced in the latter part of the year; however, the quantities of concentrate yielded during this start-up phase were not sufficient to offset losses from other sources.

Overall, these production problems contributed to a drop of 12% in the quantity of zinc produced in the Province. However, elevated prices caused the value of zinc to increase by 14% over last year. Zinc provided the largest portion of mineral production value at 53%. Lead is also a significant contributor at 8% despite a 6% decrease in value from 1988. Excellent copper prices for the year translated into a 12% increase in value of production. Cadmium and bismuth, significant by-products of Brunswick's lead smelting operation, decreased in value because of a decline in average prices as well as reduced production. With antimony prices plummeting near year's end and the Durham mine showing limited reserves, Dominion Explorers Inc. decided that Canada's only primary producer of antimony would close January 19, 1990. Low metal prices contributed to a marked decrease in production value from the preceding year. Brunswick Mining and Smelting Corporation Limited also produced antimony as a by-product.

The value of gold and silver production declined by 25% from last year's value. Since most gold and silver is produced as a by-product at Brunswick's smelter, reduced production was a major contributing factor to their decrease in value. A drop in price was also a factor. The loss of production from the Gordex Minerals Limited mine was partially offset by the commissioning of New Brunswick's second primary gold/silver producer, the Murray Brook mine, in the last quarter of 1989. Recoveries and production exceeded the company's original estimates. Overall, metals contributed 70% of the value of minerals produced during 1989.

TABLE 2. MINERAL PRODUCTION IN NEW BRUNSWICK
1979 to 1989
(Compiled from Energy, Mines and Resources statistics)

Calendar Year	Metals ($)	Nonmetals ($)	Fuels ($)	Structural Materials ($)	Total ($)
1979	419 123 591	11 658 369	10 394 844	38 510 412	479 687 216
1980	302 674 000	13 192 293	17 282 186	40 981 000	374 129 479
1981	452 580 000	16 666 976	23 325 535	39 769 000	532 341 511
1982	409 832 000	20 587 126	24 630 614	43 241 000	498 290 740
1983	421 281 000	19 220 800	29 707 000	38 385 000	508 593 800
1984	497 981 000	47 973 438	29 837 000	42 178 000	617 969 438
1985	364 825 000	62 025 000	31 626 000	43 727 000	502 203 000
1986	312 466 000	118 813 000	28 027 000	42 264 000	501 570 000
1987	391 836 000	152 481 000	33 347 000	44 567 000	622 231 000
1988	604 045 000	226 908 000	33 530 000	46 319 000	910 802 000
1989(P)	639 524 000	194 218 000	33 800 000	42 005 000	909 547 000

Nonmetals contributed approximately 21% of the value of minerals producted in the Province. The majority of this (17%) comes from potash mined in the Sussex area. Potash production dropped from the previous year, as did its price. These two factors contributed to a decline of 14% in value for this fertilizer product. Sulphur, also used in fertilizer, is a by-product of the lead smelting process. The value contributed by this commodity was also down in 1989, again the result of reduced production from the Brunswick mine.

Peat, harvested in northeastern and eastern New Brunswick, contributed significantly to the value of nonmetal production. However, a marginal decrease in the amount produced is reflected by a slightly lower value of production.

Other contributors to New Brunswick's nonmetallic mineral industry are salt and silica, both of which are produced in the Sussex area. The value of these commodities varied little from 1988 figures. Overall, the value of nonmetal production decreased by 14% from last year.

Coal is the major contributor to the value of fuels produced; natural gas is a minor contributor. Coal production, which dropped marginally from the previous year, contributed about 4% to the value of

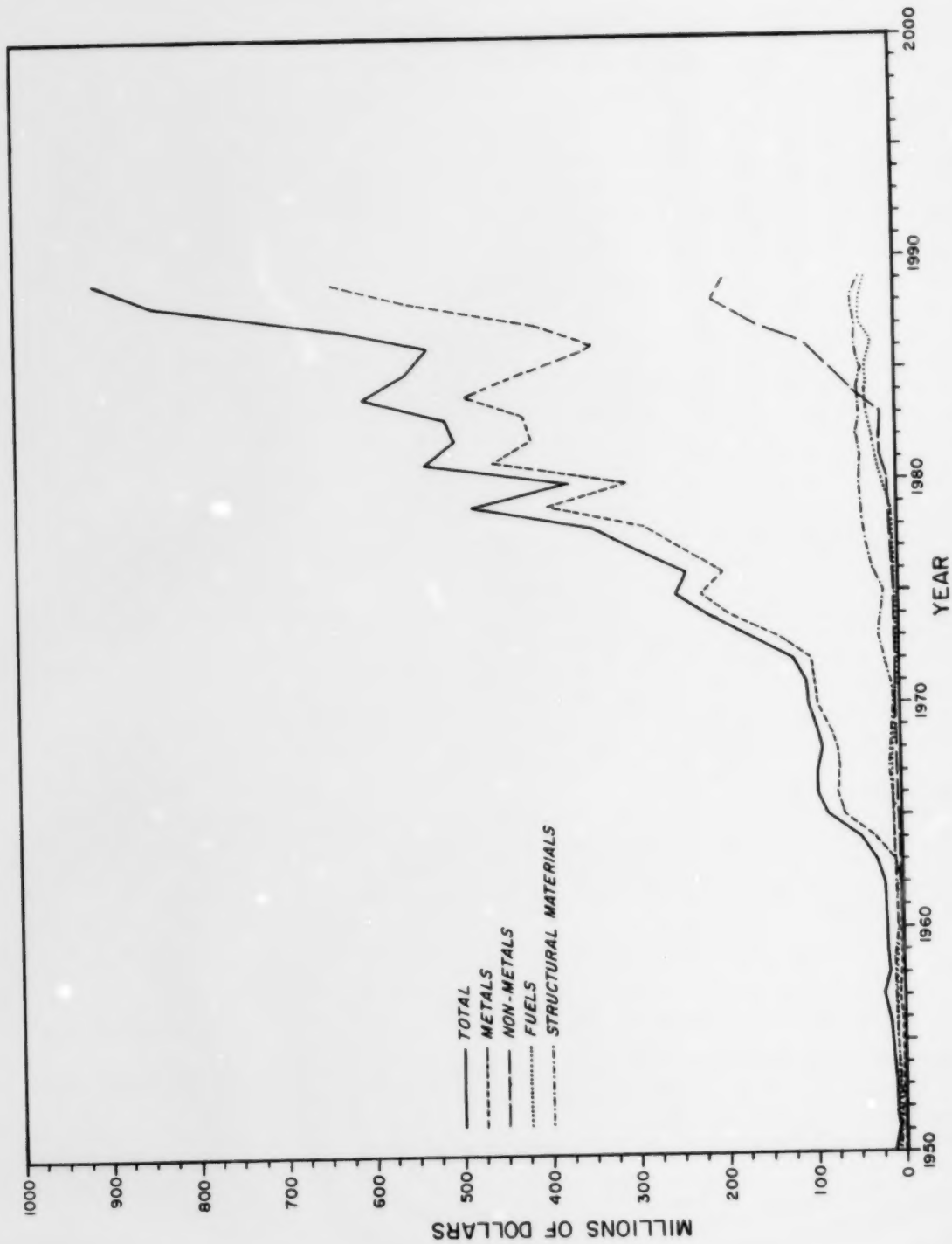


Figure 19. Value of mineral production in New Brunswick, 1950-1989. (Values have not been adjusted to account for inflation.)

TABLE 3. MINERAL PRODUCTION IN NEW BRUNSWICK, 1989
(Compiled from Energy, Mines and Resources statistics)

Preliminary Estimate

METALS	Units	Quantity	Value ($)
Antimony	kg	---	5 526 000
Bismuth	kg	155 000	2 286 000
Cadmium	kg	41 000	666 000
Copper	kg	8 264 000	28 259 000
Gold	g	341 000	4 952 000
Lead	kg	68 356 000	71 227 000
Silver	kg	197 000	40 987 000
Zinc	kg	224 616 000	485 621 000
TOTAL			639 524 000
NONMETALS			
Gypsum	t	---	---
Peat	t	217 000	21 630 000
Potash	t	---	---
Silica*	t	---	---
Salt	t	---	---
Sulphur (in smelter gas)	t	85 000	12 844 000
TOTAL			194 218 000
FUELS			
Coal	t	525 000	33 800 000
Natural Gas	m^3	---	---
Petroleum Crude	m^3	---	---
TOTAL			33 800 000
STRUCTURAL MATERIALS			
Clay products	t	---	2 565 000
Cement	t	---	---
Lime**	t	---	---
Sand and Gravel	t	9 039 000	---
Stone	t	2 250 000	15 228 000
TOTAL			42 005 000
GRAND TOTAL 1989, Preliminary (CDN $)			$909 547 000
GRAND TOTAL 1988 (CDN $)			$910 803 000

* Formerly reported as "Quartz"
** Includes all limestone products except aggregate

production. Coal production may increase with the proposed development of the Beersville deposits and the planned expansion of the Grand Lake generating station.

Structural materials, comprising clay, lime, stone, and sand and gravel, contribute about 5% to the value of mineral production, with lime, stone, and sand and gravel being the major commodities. Lime production was up significantly (30%) over last year as was its value. However, stone and sand and gravel experienced lower prices and levels of production.

Compared to mineral production in other Canadian provinces, New Brunswick's production ranked first in antimony and bismuth; second in clay products, lead, peat, and sulphur; third in silver and zinc; and fifth in copper and stone (Table 4).

In 1990, the mineral industry in New Brunswick is expected to be as successful as it was in 1989. Brunswick Mining and Smelting Corporation Limited has initiated steps to overcome its shortfall in production and East West Caribou Mining Limited is expected to restart its mine in the first quarter of 1990 at an expanded capacity. Heath Steele Mines has completed its startup phase and full production is underway. Marshall Minerals Corp. and Stratabound Minerals Corp. have plans to custom mill their ore following startup in 1990. NovaGold Resources Inc. is conducting exploration work on the Mount Pleasant tin deposit, with a feasibility study expected to follow. As well, Murray Brook Resources Incorporated has made application to mine the copper portion of its deposit, which underlies the gold-bearing gossan cap. Gordex Minerals Limited is also anticipating a solution to its financial difficulties so that the Cape Spencer mine can be reactivated. Metal prices are expected to remain relatively stable through- out the year and this, combined with the indicated improvement in production, should result in a prosperous year for New Brunswick's mineral industry.

EMPLOYMENT

Employment in the mineral industry was up significantly from the previous year, from an average total of 4736 in 1988 to 4859 in 1989. This improvement can be attributed mainly to steady mineral prices over the year, which resulted in new projects being developed as well as existing operations being upgraded.

The following gives employment by sector in the mineral industry for 1989: Metals - 2671; Potash - 926; Coal - 210; Peat - 916; Structural Materials - 136.

Scientific, technical, administrative, and casual personnel employed by the Province in support of mineral resource development totalled 63 for 1989.

TABLE 4. RANK OF PROVINCES AND TERRITORIES, IN VALUE OF PRODUCTION FOR LEADING MINERALS IN CANADA, 1989 (P)
(Compiled from Energy, Mines and Resources statistics)

Mineral	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Y.T.	N.W.T.	Total Value Canada ($ millions)
Natural Gas				6		4		3	1	2		5	5 222 026
Zinc	8		x	3	6	2	7	x		5	4	1	2 843 822
Copper			x	5	3	2	4	6		1	x	7	2 414 572
Gold	x		x	8	2	1	6	7	9	3	5	4	2 297 747
Coal			4	5				3	1	2			1 835 500
Cement	x		x	x	2	1	x	x	x	x			998 170
Potash				x				x					946 960
Sand and Gravel	9	12	8	7	4	1	5	6	3	2	10	11	837 806
Stone	7		3	5	2	1	6		8	4		9	832 599
Lead				2		x	4			1	x	3	287 383
Salt			x	x	x	1		3	2				270 179
Silver	x		x	3	4	2	6	x		1	5	7	263 308
Lime				x	x	1	x		2	3			207 223
Clay Products	x		x	2	x	1	x	x	x	x			196 724
Gypsum	x		1	x		2	x			3			92 544
Sulphur (in Smelter Gas)			6	2	5	1				3	6	4	85 179
Peat	4		x	2	1	x	x	x	3				82 832
Cadmium	5			7	6	1	4	9		2	8	3	27 739
Antimony				1			-			2	3	4	5 980
Bismuth				1		3	-			2			2 432

x - Confidential information under the Statistics Act.

METALLIC MINERALS

Brunswick Mining and Smelting Corporation Limited 21 P/5W

Brunswick operates one mine (No. 12), a concentrator, a lead smelter, and a fertilizer plant.

LOCATION: The Brunswick No. 12 mine is located about 24 km west of Bathurst in Gloucester County (Lat. 47°28.5'N and Long. 65°53.5'W). The concentrator is adjacent to the No. 12 mine (Figure 20). The lead smelter is located at Belledune Point, about 45 km from the No. 12 mine.

RIGHTS In 1962, Brunswick Mining and Smelting Corporation Limited was granted surface and mineral rights to the No. 12 mine property.

COMPANY Head Office - P.O. Box 45, Commerce Court W., Toronto; Mine Office - P.O. Box 3000, Bathurst; Smelter Officer - P.O. Box 2000, Belledune. The President is J.C. White; Manager of the Mining Division is J.R. Schnarr; General Manager of the Smelter and Fertilizer Division is A.B. Neil.

HISTORY: Although sulphides were noted in 1907, it was the drilling of ground electromagnetic targets in 1952 that located the No. 6 deposit. Investigation of another electromagnetic anomaly on strike pin-pointed the site of the No. 12 mine in 1953. The property was granted to Brunswick Mining and Smelting Corporation Limited, which was controlled at that time by St. Joseph's Lead Company. During the period 1953-57, an open pit and pilot mill were constructed at the No. 6 location. In 1961, interest was transferred to M.J. Boylen, K.C. Irving, and Patino Corporation. Development commenced at No. 12 in 1962 and mine production began in 1964. Production began at No. 6 mine in 1966. In 1967, Noranda invested $50 000 000 and gained control of Brunswick Mining and Smelting Corporation Limited. Noranda proposed a $50 000 000 expansion, which was started in 1974 and completed in 1981. A total capital expenditure of $69 000 000 was made at the mine and smelter between 1979 and 1981. The No. 6 mine was exhausted in 1983.

In 1985, the adjoining Belledune fertilizer plant, which produces a diammonium phosphate fertilizer product using sulphuric acid produced by the smelter, was purchased by Brunswick Mining and Smelting Corporation Limited. In 1986, Brunswick Mining began deepening its No. 3 shaft to 244 m.

EMPLOYEES In 1989, there were 1516 regular and contract employees at the mine and an average of 664 employees at the smelter and fertilizer plant.

RESERVES Proven: 74 977 000 t of ore grading 8.87% Zn, 3.60% Pb, 0.30% Cu, and 99.5 g/t Ag; Probable: 13 798 000 t grading 9.10% Zn, 3.62% Pb, 0.41% Cu, and 110.1 g/t Ag.

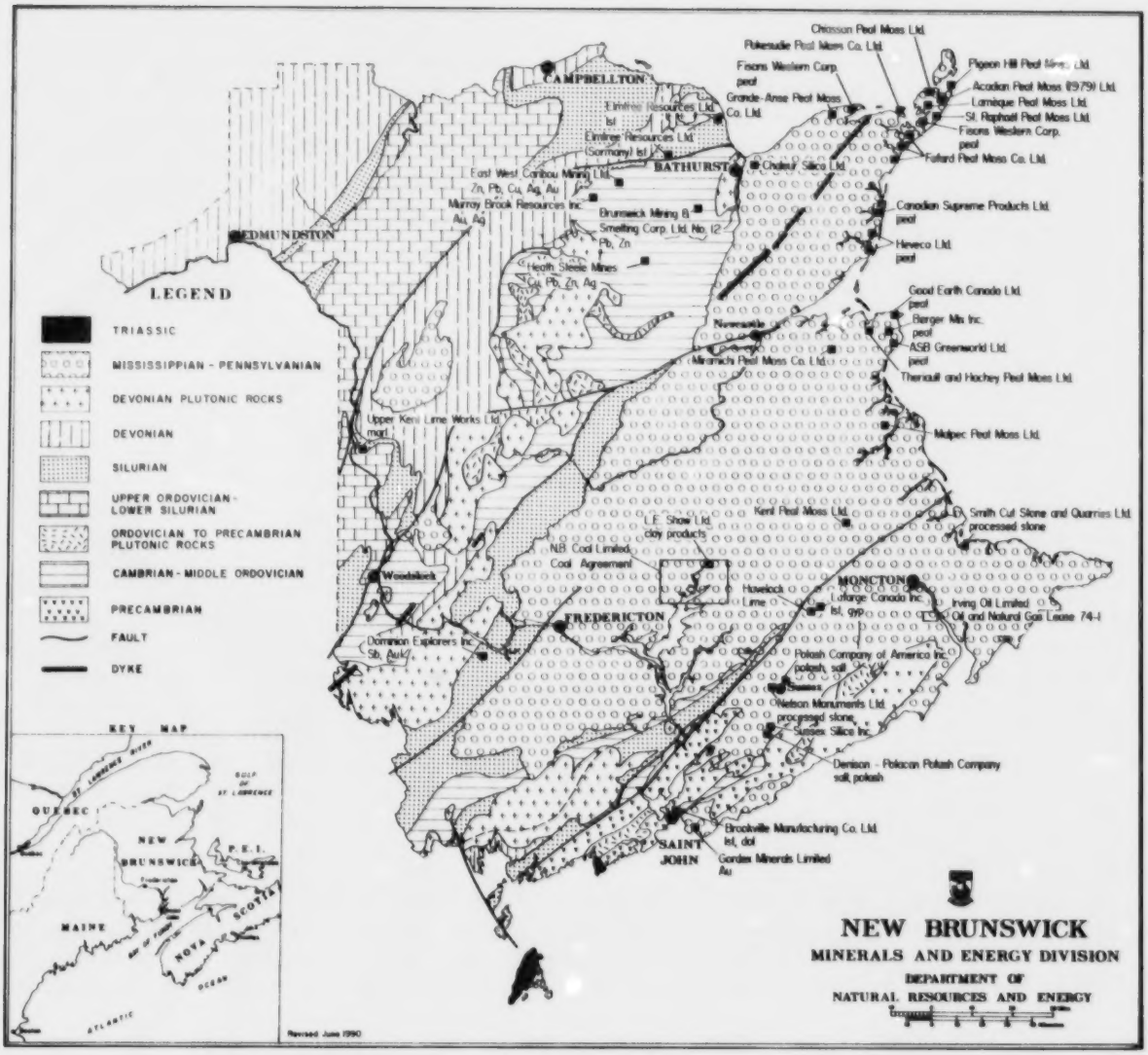


Figure 20. Nonrenewable resource producers in New Brunswick in 1989.

PRODUCTION

	Production (t)	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)
MILLED ORE (No. 12 mine)	3 022 618	0.39	3.56	8.93	109.5
CONCENTRATE					
Copper	33 000	21.4			2 646
Lead	159 000		33.5		482
Zinc	387 000			50.3	
Bulk	57 000		19.8	33.2	390

DEVELOPMENTS Brunswick celebrated its 25th anniversary in 1989.

In the first half of the year activity proceeded as planned but in the second half, the company experienced production problems related to modifications to No. 3 shaft, a shortage of backfill, and startup delays at the Heath Steele mine. Production improved significantly during the latter part of 1989. However, the production of a lower than normal grade of lead concentrate contributed to the company's decision to conduct a shutdown of the lead smelter in the first quarter of 1990.

Although the year was expected to be profitable for Brunswick because of elevated zinc, copper, and lead prices, events during the last half of the year precipitated a serious decline in revenue that resulted in a net loss of $4 500 000 for the fourth quarter. The net return for the year was $29 700 000 compared to $31 000 000 for 1988.

During the last quarter of 1989, changes were made in senior management, and the corporate office in Belledune was eliminated. Management has emphasized that in the future Brunswick will expect each of the company's divisions to be independently profitable. Employment at the operation remained relatively steady in 1989; however, some overall reduction is expected in 1990. In 1989, there was concern among the miners about increased seismic activity in the mine. The current three-year collective agreement with the United Steelworker's Union will end in 1990.

Zinc and bulk concentrates continue to be shipped to foreign ports from Brunswick's port facilities in Belledune, also the location of the lead smelter and fertilizer plant. In addition to lead, the smelter produces significant quantities of antimony, bismuth, copper, gold, and silver. Sulphur dioxide smelter gas is used to make sulphuric acid, a key component in the manufacture of diammonium phosphate (DAP) fertilizer that is produced at the adjacent plant.

Reclamation of the No. 6 mine site continued with the removal of structures, revegetation, and the neutralisation of acid-generating material by disposal into No. 6 pit. Revegetation was also carried out on the No. 12 property. The generation of thiosalts in the tailings drainage continues to be Brunswick's major environmental concern.

Dominion Explorers Inc. 21 G/14E

LOCATION The Lake George antimony mine is situated about 15 km north of Harvey Station, York County (Figure 20).

RIGHTS In May of 1989, Dominion Explorers Inc. converted Mining Licence 1235 to Mining Lease 250 under the Mining Act, Chapter M-14.1, S.N.B. 1985.

COMPANY Dominion Explorers Inc. (Durham Mines Division) owns and operates North America's largest and Canada's only primary producing antimony mine. Dominion Explorers Inc. is a subsidiary of Landmark Corp. The head office is located at 111 Richmond Street West, Toronto, Ontario, M5H 2G4. Chairman, president and CEO is R.B. Coleman; the Mine Manager is C. Morrissy.

HISTORY Antimony sulphide was first discovered on the property in 1863. There was minor production between 1880 and 1884. The first major development that led to production occurred between 1969 and 1971. The mine produced until 1981 when it ran out of known reserves. Exploration diamond drilling in 1980-1981 outlined a new antimony ore zone (No. 2 mine) with reserves of 900 000 t of 4% Sb. Development and mining began in 1985. At the June 25th, 1987 Annual Meeting of Landmark Corporation (formerly Durham Resources Inc.) the company's Lake George antimony mine (Durham Mines) was sold to a Landmark-controlled subsidiary, Dominion Explorers Inc. The former Durham Resources Inc. now operates under Dominion Explorers Inc. (Durham Mines Division).

EMPLOYEES There were 86 persons employed on the site in 1989.

RESERVES 181 400 t possible tonnage grading 3.22% Sb.

PRODUCTION Production in 1988 was 88 038 t of ore yielding 3722 t of antimony concentrate.

DEVELOPMENTS Dominion Explorers Inc. (Durham Mines Division) continued to operate through 1989 as Canada's only primary producer of antimony. However, it was announced that the Durham mine would shut down permanently on January 19, 1990. The parent company, Dominion Explorers Inc., blamed a number of factors, but paramount was the steady decrease in the price of antimony concentrate, mainly due to an over supply of antimony from both Chinese and Bolivian sources. This, combined with an unfavourable exchange rate for the Canadian dollar and low ore reserves (less than 2 years supply), finally forced the company to make this unfortunate decision.

The company made a concerted attempt during the year to remain viable by reducing annual operating costs as much as 12%. However, it was not sufficient to offset the decrease in revenue. As a final attempt, the company and the Federal government negotiated an agreement for a work-sharing programme on a reduced-work-week basis (2 days). However, this was not fully implemented because antimony prices continued to drop.

The Federal and Provincial governments established an industrial adjustment committee that will attempt to locate new jobs for the affected miners. Some employment is expected to be found at other mining operations within New Brunswick, especially in the north.

If no other use can be found for the property, reclamation will commence in accordance with the Mining Act.

East West Caribou Mining Limited 21 0/9W

LOCATION The Caribou deposit is approximately 40 km west of Bathurst in Restigouche County (Figure 20). (Lat. 47°34'N; Long. 66°17.6'W)

RIGHTS In 1989, East West Caribou Mining Limited held Mining Lease 246 under the Mining Act, Chapter M-14.1, S.N.B. 1985.

COMPANY East West Caribou Mining Limited, P.O. Box "A", Bathurst, N.B. E2A 3Z1. The Mine Manager is J. James.

HISTORY The mineralization was discovered in late 1955 by Anaconda Copper Mining Company through regional geological mapping using aeromagnetic maps and photo interpretation. Ground EM pin-pointed the drill target. Anaconda excavated an adit in the late 1950s, and in the late 1960s and early 1970s an incline was driven from the adit. Coincidentally, a 907 t/d mill with a copper concentrator was constructed. Mining of secondary (near-surface) copper took place between November, 1970 and November, 1971. Metallurgical problems caused shut-down. Production resumed in September, 1973 and continued for one year. In 1983 heap leaching of gossan was completed. Gold and silver extracted in 1983 amounted to 88 582.77 g and 1 688 018 g, respectively.

In late 1986, East West Minerals, N.L. of Sydney, Australia acquired Anaconda Canada Exploration Limited and Caribou Chaleur Bay Mines Ltd., which constitute the Caribou property. A decision was made in 1987 to proceed with the construction of a 2000 t/d mine/mill that would produce a lead-zinc bulk concentrate suitable for feedstock to an Imperial Smelting Furnace. Work began on the project in the latter part of 1987 and proceeded until the early part of 1988. At this time expected equity financing from stock market sources did not materialize. Financing for the project was eventually arranged through a five-year limited-recourse debt package of $30 000 000(C), organized through Westpac Banking Corporation and National Australia Bank Ltd., and the Royal Bank of Canada. A further $15 000 000(C) was made available through a silver debenture issue, 50% guaranteed by the Province of New Brunswick (Mining Journal, March 17, 1989).

Project development resumed in the second quarter of 1988. The reclamation plan received approval in October, 1988. On October 28, 1988 Caribou New Brunswick Mining received its Mining Lease, and subsequently changed its name to East West Caribou Mining Limited.

EMPLOYEES 125 at the end of the year.

RESERVES 5 428 000 t of proven and probable ore grading 8.77% Zn, 3.91% Pb, 113.25 g/t Ag, and 1.66 g/t Au, plus an additional 5 500 000 t of possible ore grading 8.37% Zn, 3.59% Pb, 101.76 g/t Ag, and 1.78 g/t Au.

PRODUCTION Secondary copper ore (825 552 t) was extracted from the open pit between November, 1970 and September, 1974. The average grade was 3.4% Cu. Production figures for 1989 are not available at this time.

DEVELOPMENTS Commissioning of the Caribou mill began in November of 1988 and the first shipment of concentrate (6734 t) left the port of Dalhousie in February, 1989, bound for Australia Mining and Smelting's (AM&S) smelter in Avonmouth, England. The mill exceeded initial design capacity during that period, with higher metal recoveries and mill throughput reaching 2700 t/d, 700 t/d over design. The mine was officially opened on June 2, 1989, by the Hon. Morris Green, Minister of Natural Resources and Energy and Sir William Keys, board chairman of East West Minerals, N.L.

In July of 1989, East West Caribou Mining Ltd. ceased production due to a cash-flow imbalance. The initial result was the layoff of 60 contract miners and the commencement of negotiations with the Province and Australian banks to secure additional financing for the project. In August, it was announced that East West Minerals, N.L. had reached an agreement with Bathurst Base Metals Corp. to implement a revitalization plan for the Caribou mine. Breakwater Resources Ltd. of Vancouver was retained to manage the mine. The permanent workforce was subsequently cut to 40 while revisions to the operation took place. A three-compartment shaft is to be installed to a depth of about 400 m.

The company proposes to upgrade the daily mill throughput to 2500 t/d and sink a shaft to facilitate the increased tonnage requirements. Depending upon when final approval of the proposed revisions is obtained from the financiers and government, mining and milling are expected to start in the first quarter of 1990.

Gordex Minerals Limited — 21 H/4W

LOCATION The Gordex Minerals Limited gold property is located at Cape Spencer, 15 km southeast of the City of Saint John, along the Bay of Fundy coast (Figure 20).

RIGHTS In 1989, Gordex Minerals Limited in partnership with Cambior Inc. (55%) held Mining Licence 1371 under the Mining Act, Chapter M-14.1, S.N.B. 1985.

COMPANY Gordex Minerals Limited, P.O. Box 7071, Station A, Saint John, N.B. E2L 4S5. The President of Gordex Minerals Limited is Mr. Morton Gordon.

HISTORY Minor amounts of gold were found near the lighthouse several years ago. The property was staked in 1979-1980 by Mr. Morton Gordon. An intensive exploration programme conducted during the summer of

1982 led to the delineation of an extensive alteration zone with numerous gold-bearing quartz veins. Gordex Minerals Limited mined 30 000 t of ore from its surface workings on the Cape Spencer gold deposit in 1985 and has received permission from the appropriate provincial departments to operate a 30 000 t demonstration plant to leach gold from the ores. In addition, another 15 000 t was placed on the heap pad in 1986. The leaching of the gold with $Ca(CN)_2$ was carried out in the summer of 1986 and the recovery of gold from the demonstration heap leach was successful. At the end of the year, Gordex was carrying out a substantial exploration programme to confirm ore reserves in the Cape Spencer area. During 1987 several modifications were made to the gold extraction procedure at Cape Spencer. The heap leaching operation was converted to an earthen vat leaching process. This provides a better means of controlling extraneous water from diluting the leach cycle. At the same time the gold extraction mechanism was converted from a zinc precipitate to a carbon-in-pulp treatment. Both these changes have resulted in better recoveries of gold.

Additional interest in the operation was sparked by a drilling programme initiated by Gordex which indicated a gold mineralization zone approximately 130 m wide with a strike length of 160 m, open at a depth of 95 m to 210 m. Intersections from the 11 holes drilled graded 6.17 g/t Ag (cut grade) over an average width of 5.6 m.

EMPLOYEES Average of 10 from January to June.

RESERVES (Published) 671 328 t of ore, grading 3.3 g/t Au, has been outlined on the property to a depth of 152 m. The property has potential reserves of 3 000 000 t.

PRODUCTION No mine production, processing of previously mined ore only.

DEVELOPMENTS Gordex Minerals Ltd. continued to treat ore at its Cape Spencer mine in 1989. However, no mining was performed during the year. Low gold prices forced the company to discontinue full operation. This resulted in the termination of most of the workforce and operating management. Only a few persons were retained to carry out leaching and waste-water treatment.

A cease-trading order was issued in July, 1989, because of the company's failure to file audited financial statements. Since that time the company has been negotiating with the Ontario Securities Commission to allow resumption of trading on the Toronto Stock Exchange.

Gordex has continued to seek a partner to share in the cost of exploring areas on the property with indicated potential. Drilling in 1988 demonstrated that there was gold mineralization to the north of the area currently being mined. However, the present financial situation appears to be discouraging likely partners from investing in exploration of the zone. The exploration programme expected to be undertaken by Cambior Inc. was not carried out and the company's option agreement was allowed to lapse. A potential agreement with Societe Miniere Sphinx Inc. (ME) also failed due to low gold prices and Gordex's debt.

Attempts are presently underway to refinance the debt load and make the property more attractive to potential investors. Improvement in the price of gold may help Gordex to obtain financial backing in 1990.

Heath Steele Mines, a Division of Brunswick Mining and Smelting Corporation Limited 21 O/8

LOCATION The Heath Steele mine is located 51 km northeast of Newcastle in Northumberland County (Lat. 47°17'N; Long. 66°05'W). The Stratmat boundary deposit (west zone) is located approximately 5 km northwest of the Heath Steele mill complex (Lat. 47°13'N; Long. 66°07'W). (Figure 20)

RIGHTS In 1989, Heath Steele Mines, a Division of Brunswick Mining and Smelting Corporation Limited, held Mining Lease 238 (Heath Steele deposit) and Lease 253 (Stratmat boundary deposit) under the Mining Act, Chapter M-14.1, S.N.B. 1985.

COMPANY The mine operates under the name Heath Steele Mines, a Division of Brunswick Mining and Smelting Corporation Limited. The head office address is P.O. Box 45, Commerce Court West, Toronto, Ontario M5L 1B6. The mine office address is P.O. Box 400, Newcastle, New Brunswick E1V 3M5. The President and CEO is J.C. White and the Mine Manager is J. Martin.

HISTORY The Heath Steele deposit was discovered in 1954 by airborne electromagnetic surveying. Mining began in 1957 but was suspended between 1958 and 1962 because of low metal prices and poor recoveries. The mine reopened in 1962 with a contract to treat the ore from Cominco's Wedge mine. In 1968, the mine began operating under the name Little River Joint Venture, managed and owned by AMAX (75%) and INCO (25%). In 1979, Noranda Exploration Company, Limited acquired AMAX's 75% share and ASARCO acquired INCO's 25% share.

On April 29, 1983 sulphide operations ceased because of low metal prices and diminished revenues. The plant was converted to treat gossan ores in order to recover gold and silver. This cyanide treatment process started in July 1983. After some start-up problems, the plant operated well, treating a peak of 517 t/d. The gossan operations continued until October 1984.

The Stratmat main (east) zone was discovered by Strategic Metals in 1956 following geophysical surveys. The company drilled holes 61-1 to 61-36 in 1956-57, then optioned the property to Cominco Limited in 1959. Exploration by Cominco led to the discovery of the boundary deposit (West Zone) in 1961, and the stringer and central zones in 1972. The Stratmat north zone was discovered in 1980 following the drilling of geophysical anomalies. The boundary deposit lies on the boundary between the Heath Steele and Cominco properties.

Mineral dressing tests carried out at Heath Steele in 1982 were very successful. In 1987, R.R. Irrinki of the New Brunswick Department of Natural Resources and Energy, Geological Surveys Branch, completed an ore reserve estimation for the property. In 1986, the boundary deposit was drilled by Brunswick Mining and Smelting Corporation Limited to obtain metallurgical samples. Preliminary results indicated good grade zinc, lead, and silver, and excellent recoveries.

In 1986, Brunswick Mining and Smelting Corporation Limited acquired ASARCO's 25% share in the Heath Steele mine and Noranda Exploration Company, Limited acquired the Stratmat property. Brunswick and Noranda each hold 50% interest in the Stratmat property.

During 1988, Heath Steele Mines, a Division of Brunswick Mining and Smelting Corporation Limited, completed the Stratmat exploration programme and followed that with a feasibility study on the economics of reopening the Heath Steele property.

GEOLOGY Banded massive sulphides occur as boudins and dismembered layers within a high-strain zone in metasedimentary host rocks. Disseminated sulphides occur in the tectonized and illitized metasediments between the boudins.

The massive sulphides consists of fine- to medium-grained interbanded sphalerite-galena and pyrite, with local coarse-grained chalcopyrite. Vaguely banded pyrite-chalcopyrite occurs locally. Disseminated sulphides include medium-grained pyrite and/or sphalerite with smaller amounts of galena and chalcopyrite. The sulphide deposits and the metasediments are sandwiched between two polydeformed sequences of felsic crystal and lapilli tuffs ("Northwall and Southwall sequences"). Gabbro and diabase dykes cut the supracrustal rocks. All rocks are thought to be Middle Ordovician in age (Tetagouche Group). The shapes and attitudes of the sulphide-bearing zones are controlled by two dominant sets of folds.

EMPLOYEES 270 on site.

RESERVES

Reserve Type	Deposit	Ore (t)	Average Grade Pb (%)	Zn (%)	Cu (%)	Ag (g/t)
Proven	Heath Steele and Stratmat	3 910 000	2.54	6.51	0.67	68
Indicated	Heath Steele	10 242 000	1.30	4.80	1.32	62
	Stratmat	2 191 000	2.49	6.24	0.27	59
	Other	6 057 000	2.83	8.90	0.07	27

PRODUCTION 1989

Mine	Ore (t)	Average Grade Pb (%)	Zn (%)	Cu (%)	Ag (g/t)
Heath Steele B	218 000	2.09	6.04	0.64	82
Stratmat	101 000	3.21	7.95	0.47	41

DEVELOPMENTS A decision was made on February 20, 1989 to proceed with the reopening of the Heath Steele mine. The fact that Heath Steele will be able to share some common facilities with Brunswick was a major factor in the reopening. Other contributing factors were high base-metal prices and an agreement with Cominco Ltd. to develop the Stratmat property.

The company proposal to open the mine was submitted for screening under t'.e Environmental Impact Assessment Regulation and was screened out on the condition that the proposal receive approval under the Water Quality Regulation and the Mining Act.

The operation is designed to run at a rate of 2200 t/d, with mill feed coming from three zones on the property (Stratmat, B-Zone, and E-Zone).

Production from the Stratmat open pit began in the third quarter of 1989, with some underground extraction taking place as well. The B-Zone began producing in June and supplied ore to Brunswick's mill during the re-roping of Brunswick No. 3 shaft.

Refurbishing of the Heath Steele mill was completed and production started in August. Ore-handling problems associated with talc and clay in the Stratmat ore and metallurgical difficulties with the B mine ore prevented the concentrator from achieving planned production targets in 1989.

Project feasibility was based on current reserves lasting five years. However, other deposits on the property could extend the life of the operation. Heath Steele Mines is also in a position to consider custom milling other local ores to improve profits and extend the life of the operation.

Murray Brook Resources Incorporated 21 O/9W

LOCATION The Murray Brook gold, copper, zinc, lead deposit is located approximately 80 km west-southwest of Bathurst in Restigouche County (Figure 20). (Lat. 47°31.5'; Long. 66°25.8') It is accessible via Highway 180 and a newly built access road.

RIGHTS In 1989, Murray Brook Resources Incorporated held Mining Lease 252 under the Mining Act, Chapter M-14.1, S.N.B. 1985.

COMPANY The Murray Brook Project is owned and operated by Murray Brook Resources Incorporated, whose parent company is NovaGold Resources Inc. This present situation is the result of a merger in late 1988 between Northumberland Mines Ltd., the previous owner of the property, and NovaGold Resources Inc.

The head office for NovaGold Resources Inc. is: Second Floor, 1583 Hollis St., Halifax, Nova Scotia, B3J 1V4. The President is Mr. Gerald J. McConnell; the Vice-President of Canadian Operations is Dr. William L. Young, P. Eng. The mine office address is P.O. Box 189, Beresford, N.B. E0B 1H0. The Mine Manager is C.N. Smith, P. Eng.

HISTORY The deposit was discovered in 1956 by Kennco Explorations (Canada) Limited by tracing a stream-sediment anomaly to source, in claims that had been previously staked over airborne geophysical anomalies. The property was subsequently optioned to a number of companies including Cominco Ltd., Gowganda Silver Mines Ltd., Canex Placer, and Northumberland Mines Ltd. Northumberland, primarily interested in the precious-metal content of the gossan, submitted a feasibility report, including a reclamation plan, in late 1986. Both of these were subsequently approved by the appropriate provincial government agencies, thus permitting Northumberland to proceed with the initial stages of mine development on the Murray Brook site. In 1988, Northumberland Mines Limited and the Murray Brook deposit were acquired by NovaGold Resources Inc. NovaGold received federal loan guarantees through the Atlantic Canada Opportunities Agency as well as interim financing from the Province of New Brunswick. It is understood that the required equity financing has been put into place through a $2 000 000 limited partnership offering.

The project has an approved reclamation programme and has submitted a revised feasibility plan as part of their application for a Mining Lease. Work was undertaken during 1988 to upgrade roads in to the property as well as some preparatory work on the site itself to facilitate construction.

GEOLOGY The deposit consists of a large low-grade massive sulphide body that is capped by a thick blanket of pre-Pleistocene gossan. Chloritic and calcareous mudstones (phyllites) are spatially associated with the sulphides - predominantly pyrite, sphalerite, chalcopyrite, galena, and arsenopyrite. The deposit sits within a sedimentary unit (dominantly phyllite) that is sandwiched between mafic volcanic rocks to the north and felsic volcanic rocks to the south, all of which belong to the Ordovician Tetagouche Group.

EMPLOYEES 37 employees will be required for the life of the mine.

RESERVES A definition drilling programme conducted during the winter showed the mineral reserves in the gossan are 1 700 000 t grading 1.51 g/t Au and 65.5 g/t Ag. Geological reserves of the copper zone are 356 360 t grading 4.58% Au at a 2% Cu cutoff or 1 407 400 t grading 1.88% Cu at a 0.5% Cu cutoff.

PRODUCTION Gold production is expected to be 466 500 g annually over a five-year period, with silver averaging 7154 kg annually. In

October, the company reported that about 18 000 t of gossan have been processed, from which 1500 t of precipitate were recovered grading 23 712 g/t Au and 180 kg/t Ag. The accumulated lead grade is 1.4 g/t Au and 48 g/t Ag, with recovery rates of 87.7% and 19.1%, respectively.

DEVELOPMENTS Construction at the mine site began in March, 1989, and was completed by late summer. Production commenced in September and on October 27, 1989, the Hon. Frank McKenna officially opened NovaGold's Murray Brook mine (Figure 21). The gossan zone is currently being mined, and milling is proceeding at a rate of approximately 1050 t/d. Gold recoveries are greater than 80%. Both milling and recovery rates exceed the original design. The processing facility is one of only three of its type in the world and has features that enhance both its efficiency and environmental integrity. Because it is totally enclosed, ore can be leached on a year-round basis with no characteristic slowdown during the winter months. Enclosure also ensures that airborne or liquid effluent from the operation is strictly controlled.

In addition to the present gold production, NovaGold embarked on an exploratory review of the copper zone beneath the gossan. A drilling

Figure 21. Participating in the official opening of the Murray Brook mine are (l to r) Mr. Gerald J. McConnell, Vice President of NovaGold Resources Inc. (Canadian operations); Hon. Paul Kenny, MLA for Bathurst; Hon. Edmond Blanchard, Minister of State for Mines (DNRE); and Hon. Frank McKenna, Premier of New Brunswick.

programme (more than 1600 m) was conducted in late winter to test the copper zone. Initial drilling, performed in advance of mining in the present open pit, indicated approximately 298 500 t of ore grading 4.68% Cu. Drilling is underway to find the southern extension of the base-metal deposit. During the year, a feasibility study was initiated to determine if the copper zone can be mined by the open-pit method. This copper project was registered with the Department of the Environment in December.

NONMETALLIC MINERALS

PEAT

Seventeen companies were engaged in the production of peat moss in 1989. Canadian Supreme Products Ltd. suspended operations (Bogs 516 and 517) pending an evaluation of the resource. Miramichi Peat Moss Ltd. began production on Bog 3 (St. Margarets). Although weather was good and total production of peat increased by 12% this year, shipments were down by 4% with respect to 1988 levels. Baled peat accounted for 89% of the shipments; 11% of the peat shipped was in various forms of peat-based soil amendments and mixes. Most of the peat is shipped in the standard, 170 dm^3 format (54%). The average unit value increased from $4.28 to $4.66 per standard bale. The total f.o.b. value of shipments in 1989 was $29 000 000. The industry employed about 900 persons; 90% of the employees worked on a seasonal basis. The total surface area of peatland developed for production in 1989 was 4322 ha. There are 27 peat leases covering 29 peatlands; 22 leases are in production. The industry's major markets are the United States (56%); the Pacific seaboard countries, mainly Japan (20%); and Canada (19%).

Peat Shipments

Year	Standard bales*
1985	4 100 927
1986	6 028 338
1987	6 290 049
1988	6 526 080r
1989	6 244 193

* Standard bale = 0.170 m^3 of peat compressed at a ratio of 2:1, and having a 50% moisture content.
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Acadian Peat Moss (1979) Ltd.

COMPANY Acadian Peat Moss (1979) Ltd., P.O. Box 240, Lamèque, New Brunswick E0B 1V0. Telephone: (506) 344-2225. The President is Elphege Chiasson.

RIGHTS Peat Moss Lease No. 13 (232 ha) on Bog 568 under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 568 is adjacent to the Coteau Road on Lamèque Island, Gloucester County (Figure 20).

HISTORY Established in 1965, the company originally produced block-cut peat, but now produces only milled peat. Following a disastrous fire in 1981 the company resumed full production in 1982. Labour-management conflict disrupted operations in 1988.

PRESENT OWNERSHIP Acadian Peat Moss (1979) Ltd.

PRODUCTION The company produces baled peat.

DEVELOPMENT Continued expansion of existing lease.

EMPLOYEES 1989 - 11 to 53 persons.

ASB Greenworld Ltd.

COMPANY ASB Greenworld Ltd., Pointe-Sapin, Kent County, New Brunswick E0A 2A0. Telephone: (506) 876-3937. The Manager is Andreas Avenriep.

RIGHTS Peat Moss Lease No. 19 (627 ha) on Bog 324E, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 324E is located 1 km northwest of Pointe-Sapin in Kent County (Figure 20).

HISTORY The company commenced site preparation in 1978 prior to acquiring a lease in 1982.

PRESENT OWNERSHIP ASB Greenworld Ltd.

PRODUCTION The company produces baled peat and peat-soil mixes.

DEVELOPMENT Production continued at a rate consistent with market demand.

EMPLOYEES 1989 - 15 to 61 persons.

Berger Mix Inc.

COMPANY Berger Mix Inc., 121, R.R. #1, St-Modeste, Cté Rivière-du-Loup, Québec G0L 3W0. The President is Claudin Berger. Telephone: (418) 862-4462.

RIGHTS Peat Exploration Licence 85-1 (681 ha) on Bog 337, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 337 is adjacent to Highway 117, 2 km north of St-Camille, Kent County (Figure 20).

HISTORY In 1985, Berger Mix Inc. acquired a Peat Exploration Licence that was converted to a Peat Lease in 1986. Production began in 1987.

PRODUCTION The company produces milled peat.

DEVELOPMENT The company continued to expand its production fields.

EMPLOYEES 1989 - 2 to 35 persons.

Canadian Supreme Products Ltd.

COMPANY Canadian Supreme Products Ltd., P.O. Box 570, Lamèque, N.B. E0B 1V0. Telephone: (506) 344-2293. The manager is Laurie Chiasson.

RIGHTS Peat Moss Lease No. 16 (413 ha) on Bogs 516 and 517, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bogs 516 and 517 are located 1.5 km east of Portage River, Northumberland County (Figure 20).

HISTORY Portage Peat Moss Ltd. started commercial production in 1972. In 1985, Canadian Supreme Products Ltd., a subsidiary of Lamèque Quality Group Ltd., acquired the operation. The company suspended operations in 1989.

PRESENT OWNERSHIP Lamèque Quality Group Ltd.

PRODUCTION The company produces milled peat.

DEVELOPMENT No production in 1989.

EMPLOYEES 1989 - Nil.

Chiasson Peat Moss Ltd.

COMPANY Chiasson Peat Moss Ltd., P.O. Box 112, Lamèque, New Brunswick E0B 1V0. Telephone: (506) 344-2426. The President is Gilles Haché.

RIGHTS Peat Moss Lease No. 23 (76 ha) on Bog 567 under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 567 is located 3 km southeast of Petit-Shippagan (Figure 20).

HISTORY The company acquired an Exploration Licence in 1982 and converted to a lease in the same year. Before 1987, all the production was processed at the facilities of Acadian Peat Moss (1979) Ltd. A bagging plant was installed on site in 1987.

PRESENT OWNERSHIP Chiasson Peat Moss Ltd.

PRODUCTION The company produces baled peat.

DEVELOPMENT Baled peat production was continued.

EMPLOYEES 1989 - 1 to 16 persons.

Fafard Peat Moss Co. Ltd.

COMPANY Fafard Peat Moss Co. Ltd., P.O. Box 70, Shippagan, Gloucester County, New Brunswick. Telephone: (506) 336-2325. The Manager is René Martin.

RIGHTS Peat Moss Lease Nos. 4 (364 ha), 5 (506 ha), and 6 (607 ha) under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bogs are in Gloucester County (Figure 20).

Lease	Bog No.	Size (ha)	Location
4	530	364	Pokemouche Bog, off Route 113 at Inkerman
5	532	506	Six-Roads Bog, 15 km south of Shippagan
6	529	607	Inkerman Ferry Bog, 8 km southwest of Shippagan

HISTORY The company began operations in New Brunswick in 1942 by opening a bog near Shippagan (Bog 530). New plants were opened in 1955 at Six-Roads (Bog 532) and in 1960 at Inkerman Ferry (Bog 529). Initial production was block-cut peat but by 1973 the entire operation had changed to milled peat. Since 1985, the production of baled peat mixes has become an important aspect of the New Brunswick operation.

PRESENT OWNERSHIP Fafard Peat Moss Co. Ltd.

PRODUCTION The company produces baled peat and peat mixes.

DEVELOPMENT Continued to develop the remaining potential on Bogs 529 and 532. A perlite-vermiculite processing plant and a peat-mix plant were built in 1989.

EMPLOYEES 1989 - 18 to 145 persons.

Fisons Horticulture Inc.

COMPANY Fisons Horticulture Inc., Maisonnette, New Brunswick E0B 1X0. Telephone: (506) 727-3428. The Manager is Clarence Breau.

RIGHTS Peat Moss Lease No. 10 (1406 ha), No. 12 (396 ha) and No. 26 (318 ha) under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION (Figure 20)

Lease	Bog No.	Location
10	591	2 km south of Lamèque
	592	4 km southeast of Lamèque
12	562	6 km west of Lamèque at Maisonnette
26	527	1 km south of the centre of Shippagan

HISTORY In 1929, Western Peat Company Limited (the forerunner of Western Peat Moss Ltd.) commenced operations on a small sphagnum bog in Whalley, British Columbia. In 1963, the original shareholders sold their interests in Western to an American company, Red Wing Peat Corporation. Western became the Canadian producing company, and Red Wing assumed the responsibility for marketing the company's products in the United States. In 1964, following up work that had begun earlier, a base of operations was established at Maisonnette (Bog 562). In 1970, Red Wing established a second base of operations in New Brunswick when it purchased Atlantic Peat Moss Co. Ltd. at Shippagan. Atlantic had produced from Bog 527 (1953-1971) and from Bog 591 since 1952. In 1974, S.B. McLaughlin Associates Limited of Toronto, Ontario, purchased the holdings of the major shareholder, Red Wing, and assumed control. This was followed by the combination of the business operations of Western and Atlantic into Western Peat Moss Limited. In 1980, Fisons, a British company, acquired a 50% interest in Western Peat Moss Limited. The joint venture company was renamed Fisons Western Peat Moss Limited and then changed to Fisons Western Corporation in January 1982, when Fisons acquired the remaining McLaughlin interests. Bog 527 was abandoned in 1971 due to fire hazard to the town of Shippagan and converted to Peat Lease 26 in 1984. The new plant on Lamèque Island (Bog 591) opened in 1981. The company changed its corporate name to Fisons Horticulture Inc. in 1989.

PRESENT OWNERSHIP Fisons Horticulture Inc.

PRODUCTION The company produces baled peat and peat mixes.

DEVELOPMENT Development continued on Bog 591, eventually leading to development of Bog 592.

EMPLOYEES 1989 - 8 to 199 persons.

Good Earth Canada Ltd.

COMPANY Good Earth Canada Ltd., 5960 Broadway, Lancaster, N.Y., 14086, U.S.A. Telephone: (716) 684-8111. The President is Guenter Burkhardt.

RIGHTS Peat Moss Lease No. 30 (734 ha) on Bog 338, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 338 is located at Point Escuminac, 50 km east of Chatham, Kent County. (Figure 20).

HISTORY The company was issued a Peat Lease in 1986 following the cancellation of Peat Lease No. 21 (Gulf Peat Co. Ltd.) on January 31, 1986. Production began in 1987.

PRODUCTION The company produces milled peat.

DEVELOPMENT Site preparation included land clearing and excavation of drainage ditches.

EMPLOYEES 1989 - 1 to 19 persons.

Grande Anse Peat Moss Co. Ltd.

COMPANY Grande Anse Peat Moss Co. Ltd., P.O. Box 90, Grande-Anse, Gloucester County, New Brunswick E0B 1R0. Telephone: (506) 732-2854. The President is Paul Tocci; the Manager is Patricia Whelton.

RIGHTS Peat Moss Lease No. 8 (166 ha) on Bog 561, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 561 is 3 km southeast of Grande-Anse (Figure 20).

HISTORY The company started block-cut peat operations in 1961 by hand cutting, but converted to mechanization in 1966. The conversion to milled peat began in 1977.

PRESENT OWNERSHIP Grande Anse Peat Moss Co. Ltd.

PRODUCTION Company produces baled peat.

DEVELOPMENT Continued production.

EMPLOYEES 1989 - 2 to 41 persons.

Heveco Ltd.

COMPANY Heveco Ltd., P.O. Box 30, Tabusintac, Northumberland County, New Brunswick E0C 2A0. Telephone: (506) 779-9277. The Manager is Myles Wishart.

RIGHTS Peat Moss Lease No. 9 (108 ha) and No. 24 (174 ha) under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 522 (Lease 24) is 2 km east of Brantville and Bog 524 (Lease 9) is 2 km southeast of Tabusintac (Figure 20).

HISTORY The company, incorporated in 1962, produces block-cut peat and peat mixes. Milled peat production commenced in 1981.

PRESENT OWNERSHIP Heveco Ltd.

PRODUCTION The company produces block-cut and milled peat, and peat mixes.

DEVELOPMENT Continued production from Bog 524. Production has begun on Bog 522.

EMPLOYEES 1989 - 10 to 126 persons.

Kent Peat Moss Ltd.

COMPANY Kent Peat Moss Ltd., R.R. #2, Saint-Paul, Kent County, New Brunswick E0A 2B0. Telephone: (506) 955-3098. The Manager is Eloi Maillet.

RIGHTS Peat Moss Lease No. 25 (393 ha) on Bog 41, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 41 is located 0.6 km west of Birch Ridge, Kent County (Figure 20).

HISTORY The company acquired a Peat Exploration Licence in 1982 and converted to a Peat Moss Lease in 1983. In 1987, Fafard Peat Moss Co. Ltd. acquired the operation.

PRESENT OWNERSHIP Fafard Peat Moss Co. Ltd., P.O. Box 70, Shippagan, New Brunswick, E0B 2P0. Telephone: (506) 336-2325.

PRODUCTION The company produces milled peat.

DEVELOPMENT The layout of production fields has been upgraded.

EMPLOYEES 1989 - 1 to 24 persons.

Lamèque Peat Moss Ltd.

COMPANY Lamèque Peat Moss Ltd., P.O. Box 570, Lamèque, New Brunswick E0B 1V0. Telephone: (506) 344-2293. The Manager is Florent Chiasson.

RIGHTS Peat Moss Lease No. 14 (142 ha) on Bog 580 and Peat Moss Lease No. 28 (104 ha) on Bog 578, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 580 is 4 km north of Lamèque and Bog 578 is 2 km north of Petite-Lamèque, both in Gloucester County (Figure 20).

HISTORY The company, established in 1971, is producing milled peat.

PRESENT OWNERSHIP Lamèque Quality Group Ltd.

PRODUCTION The company produces milled peat and fish-based peat compost.

DEVELOPMENT Lamèque Peat Moss Ltd. continued to develop the Crown portion of the bog to its full potential. Production began on adjacent Bog 578.

EMPLOYEES 1989 - 9 to 49 persons.

Malpec Peat Moss Ltd.

COMPANY Malpec Peat Moss Ltd., P.O. Box 118, Rexton, New Brunswick E0A 1L0. Telephone: (506) 523-9161. The President is Solomon Curry.

RIGHTS Peat Moss Lease No. 20 (249 ha) on Bog 213 under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 213 is located 3 km west of Rexton, Kent County (Figure 20).

HISTORY The company was issued a Peat Moss Lease in 1982. It commenced milled peat production in 1985.

PRESENT OWNERSHIP Malpec Peat Moss Ltd.

PRODUCTION The company produces milled peat.

DEVELOPMENT The company continued to expand production fields.

EMPLOYEES 1989 - 5 to 82 persons.

Miramich Peat Moss Ltd.

COMPANY Miramichi Peat Moss Ltd., P.O. Box 240, Lamèque, N.B. E0B 1V0. Telephone (506) 344-2225. The contact person is Gilles Haché.

RIGHTS Peat Moss Lease No. 31 (770 ha) on Bog 3, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 3 is located 10 km south of Bay du Vin. Access is by an upgraded woods road from Highway 11, near St. Margarets (Figure 20).

HISTORY Acadian Peat Moss (1979) Ltd. applied for a Peat Exploration Licence in 1986. A licence was issued in 1987. A Peat Lease was granted in 1988 to the newly formed affiliated company.

PRESENT OWNERSHIP Miramichi Peat Moss Ltd.

PRODUCTION The company produces milled peat.

DEVELOPMENT Site preparation continued and production began at the plant.

EMPLOYEES 1989 - 1 to 6.

Pigeon Hill Peat Moss Ltd.

COMPANY Pigeon Hill Peat Moss Ltd., P.O. Box 639, Lamèque, New Brunswick E0B 1V0. Telephone: (506) 344-5653. The President is Edmond Chiasson.

RIGHTS Peat Moss Lease No. 18 (234 ha) on Bog 569 under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 569 is located at Pigeon Hill on Lamèque Island, Gloucester County (Figure 20).

HISTORY Company acquired a Peat Moss Lease in 1979.

PRESENT OWNERSHIP Pigeon Hill Peat Moss Ltd.

PRODUCTION The company produces milled peat.

DEVELOPMENT Pigeon Hill Peat Moss Ltd. continued to expand production fields.

EMPLOYEES 1989 - 3 to 21 persons.

Pokesudie Peat Moss Ltd.

COMPANY Pokesudie Peat Moss Ltd., P.O. Box 570, Lamèque, Gloucester County, New Brunswick, E0B 1V0. Telephone (506) 727-3385. The Manager is R. Godin.

RIGHTS Peat Moss Lease No. 7 (202 ha) on Bog 600, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 600 is located on Pokesudie Island (Figure 20).

HISTORY In 1960, a lease was granted to Bushland Products Limited. The lease was transferred to Atkins & Durbrow (N.B.) Ltd. in 1967. Following a disastrous fire in 1978, the plant was rebuilt and production resumed in late 1980. Pokesudie Peat Moss Ltd., a subsidiary of Lamèque Quality Group Ltd., acquired the property in 1988.

PRESENT OWNERSHIP Lamèque Quality Group Ltd.

PRODUCTION The company produces baled peat.

DEVELOPMENT Continued peat production.

EMPLOYEES 1989 - 1 to 31 persons

St-Raphael Peat Moss Ltd.

COMPANY St-Raphael Peat Moss Ltd., P.O. Box 570, Haut-Lamèque, New Brunswick E0B 1V0. Telephone: (506) 344-7058. The Secretary-Treasurer is Florent Chiasson.

RIGHTS Peat Moss Lease No. 17 (115 ha) on Bog 576, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 576 is 4 km east of Haut-Lamèque, Lamèque Island (Figure 20).

HISTORY Peat Moss Lease No. 17 was acquired in 1977.

PRESENT OWNERSHIP Lamèque Quality Group Ltd.

PRODUCTION Company produces milled peat.

DEVELOPMENT Continued peat production with bog operating at capacity.

EMPLOYEES 1989 - 1 to 33 persons.

Theriault and Hachey Peat Moss Ltd.

COMPANY Theriault and Hachey Peat Moss Ltd., R.R.#1, Baie-Sainte-Anne, Northumberland County, New Brunswick E0C 1A0. Telephone: (506) 228-4530. The President is Isaac Theriault; the Vice-President is Gary Williston.

RIGHTS Peat Moss Lease No. 11 (330 ha) on Bog 324W and Peat Moss Lease No. 27 (125 ha) on Bog 302A under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 324W is located 6 km south of Eel River Bridge and Bog 302A is located 7 km south of Eel River Bridge, both in Northumberland County (Figure 20).

HISTORY The company was formed in 1963, but block-cut peat had been produced from the site since 1961. In 1977 the block-cutting operation was converted to a milled peat operation. The company acquired the Peat Moss Lease on Bog 302A in 1985.

PRESENT OWNERSHIP Theriault and Hachey Peat Moss Ltd.

PRODUCTION The company produces milled peat.

DEVELOPMENT Theriault and Hachey Peat Moss Ltd. is continuing to open new fields on Bog 324W. Site preparation on Bog 302A has begun.

EMPLOYEES 1989 - 3 to 48 persons.

POTASH/SALT

Denison-Potacan Potash Company 21 H/12E

COMPANY Denison-Potacan Potash Company, P.O. Box 5005, Sussex, New Brunswick E0E 1P0. Telephone: (506) 839-2146. The General Manager is I.N. Duke.

RIGHTS 8.887 ha Mining Lease, under Section 25(2) of the Mining Act, Chapter M-14.1, S.N.B 1985.

LOCATION Denison-Potacan Potash Company is located about 20 km southwest of Sussex, Kings County (Figure 20).

HISTORY The Salt Springs potash-salt deposit was discovered by the Department of Natural Resources in 1973. Subsequent exploration and development rights to a 120 km^2 reservation area were granted to International Minerals and Chemical Corporation (IMC). Full-scale exploration (22 drill holes) began in 1975, and was successful in confirming a significant orebody.

Despite extremely encouraging results of the drilling programme, IMC decided to sell the property to Denison Mines Limited of Toronto late in 1978. Construction of a 5 m diameter exploration mine shaft was commenced in September, 1979, and reached a target depth of 835 m by 1982.

In December, 1980, Denison Mines Limited assigned a 40% interest to Potash Company of Canada Limited (Potacan). Potacan is owned jointly by Entreprise Minière et Chimique, and Kali und Salz Ag. Denison Mines Limited remains the overall development manager, with potash sales being handled by Potacan.

A feasibility study completed in 1982 resulted in a production decision announcement on February 7, 1983.

Work on the No. 2 shaft, the production shaft, commenced in 1983, along with continued underground development and the construction of the surface infrastructure related to the mill facility, tailings storage, and

brine disposal. By July, 1985 all preproduction work was completed and the first shipment of potash destined for Colombia was made on September 17, 1985.

PRESENT OWNERSHIP 60% Denison Mines Ltd., 40% Potash Company of Canada (Potacan).

RESERVES AND GRADE Underground exploration in 1982 has blocked out more than 41 000 000 t of 28.5% K_2O, sufficient for the initial 5 years of production. Together with the 22 surface drill holes, the underground work to date has established total reserves of 230 000 000 t of ore (proven and possible).

PRODUCTION Production commenced in July, 1985, and has been gradually building up to the operation's annual rated capacity of 1 300 000 product tonnes. In 1989, Denison-Potacan operated at 67% of its capacity representing a 14% drop from 1988 production levels. Technical and labour-related problems are reported to have contributed to production losses.

DEVELOPMENT A new hydraulic backfill system was implemented in the mine during 1989. Such a system is to improve stope fill factors and result in improvements in ore extraction. A new crystallization circuit in the mill raised recovery rates to 90.4%. Improvements were also made in the mill's compaction and screening circuits, improving product quality.

EMPLOYEES Average of 476 persons in 1989.

Potash Company of America 21 H/11W,14W

(a Division of Rio Algom Limited)

COMPANY Potash Company of America (a division of Rio Algom Limited), P.O. Box 1489, Sussex, New Brunswick E0E 1P0. Telephone: (506) 433-5445. The General Manager of Operations is Donald Roberts.

RIGHTS 19 187 ha Mining Lease, under Section 25(2) of the Mining Act, Chapter M-14.1, S.N.B. 1985.

LOCATION The Potash Company of America mine/mill facility is located about 5 km east of Sussex, Kings County, on the north side of Highway 2 (Figure 20).

HISTORY Following the discovery of potash in the Plumweseep-Penobsquis area by the New Brunswick Department of Natural Resources in 1971, exploration and development rights covering a 360 km^2 reservation area were granted to the Potash Company of America in 1973. After a comprehensive exploration programme and feasibility study, the company decided to proceed with the construction of a 5 m diameter exploratory mine shaft in the spring of 1978. The exploration shaft was completed in April and underground exploration in October of 1980. On October 27, 1980, the Potash Company of America announced that it was proceeding to production with a mine capacity of 900 000 t/a although initial capacity would be 630 000 t/a.

Mine development, mill construction, and the Courtenay Bay potash shipping terminal in Saint John were completed in 1983. The first potash was produced from the mill on July 17, 1983. The first shipment of potash through the port facility in Saint John took place early in 1984.

PRESENT OWNERSHIP Rio Algom Limited, 120 Adelaide St. W, Toronto, Ontario M5H 1W5.

RESERVES AND GRADE Sufficient tonnage has been indicated by drilling to support a 1 000 000 t/a plant for 20 years or more.

PRODUCTION Potash and salt production commenced in 1983. The facility operated at 95% capacity in 1989.

DEVELOPMENT After purchasing PCA early in 1986, Rio Algom Limited has committed over $30 000 000 to improvements designed to bring the Sussex mine up to its rated capacity of 635 000 product tonnes per year by April 1987. A considerable amount was spent in the mine to improve the reliability and capacity of the conveyor systems. In the mill, PCA has been working toward improving equipment uptime and boosting potash recovery rates. Recovery rates have improved significantly since start-up. In 1989, PCA operated near 95% of capacity.

Work continued on improvements to the tailings handling system. A rock mechanics programme has also been initiated in the mine.

EMPLOYEES Average of 334 persons for 1989.

LIMESTONE/DOLOMITE

Brookville Manufacturing Company Ltd. 21 H/5

COMPANY Brookville Manufacturing Company Ltd., P.O. Box 2332, Saint John, New Brunswick E2L 3V6. The General Manager is M. Sanford.

RIGHTS Original King's Land Grant.

LOCATION Brookville, East Saint John, Saint John County. The quarry and crushing operation is located between Highway 1 (Sussex-Saint John Highway) and Highway 100 (Rothesay Highway), approximately 2 km east of their junction. Access to the quarry is via the Rothesay Highway (Figure 20).

HISTORY The company commenced operations more than 60 years ago, primarily producing agricultural limestone and aggregate. It has been operating almost continuously since.

PRESENT OWNERSHIP R.H. Oland (Moosehead Breweries Ltd.).

RESERVES AND GRADE At present market levels, adequate reserves of stone are estimated for several more years. Although grade varies between areas of high-calcium limestone and dolomite throughout the quarry, the bulk

of production is centred in the more dolomitic areas where grades fluctuate from 40 to 45% $MgCO_3$.

PRODUCTION The company produces about 140 000 t of aggregate products each year. These include agricultural dolomitic limestone, cement, asphaltic aggregate, and road metal.

DEVELOPMENT Continued operation.

EMPLOYEES 32 persons (average number).

LIMESTONE/GYPSUM

Lafarge Canada Inc. 21 I/3W

COMPANY Lafarge Canada Inc. The plant address is R.R. #1, Havelock, New Brunswick E0A 1W0. Telephone: (506) 534-2301. The Manager is H. Kierstead.

RIGHTS 632.5 ha Mining Lease No. 245 (includes existing plant and operating quarries). The Mining Lease is under the Mining Act, Chapter M-14.1, S.N.B. 1985.

LOCATION Limestone quarries and cement plant are located adjacent to Highway 880, about 5 km east of Havelock, Westmorland County (Figure 20).

The company also maintains mineral rights to a gypsum quarry located less than 5 km north of Petitcodiac, Westmorland County.

HISTORY Limestone quarries near the plant have been supplying raw material for manufacture of cement since 1952. In 1987, the company closed its cement production facility; however, it continues to quarry stone used for other purposes.

A new limestone quarry (the McGee quarry) was opened in 1986 just north of Highway 880, less than 1 km east of the plant. This quarry was opened in an area known to contain extensive reserves of high-calcium limestone. The property was partially investigated in 1976. A drilling programme was undertaken in 1985 to further verify the quality and extent of the deposit prior to the establishment of the new quarry site.

Initial quarrying of gypsum at Intervale began in 1880. The Albert Manufacturing Co. produced 1179 t/a, between 1932 and 1935. In 1950, the property was acquired by Canada Cement Company Ltd. (now Lafarge Canada Inc.) who had worked the quarry periodically until 1987.

PRESENT OWNERSHIP Lafarge Canada Inc.

RESERVES AND GRADE Reserves of high-grade limestone (i.e., 50-53% CaO) on properties held under Mining Lease by Lafarge Canada Inc. have been estimated between 75 000 000 t and 100 000 000 t.

Reserves of the McGee quarry are estimated in excess of 10 000 000 t of limestone grading 50% CaO or better.

At Intervale, reserves of 97% gypsum have been estimated at just less than 4 000 000 t.

PRODUCTION Historically, the company has produced up to 400 000 t of limestone annually, primarily for use in cement manufacturing. However, since the closure of its plant, stone quarried for cement production has ceased. Despite the plant shut-down, Lafarge continued to quarry stone at its McGee quarry through 1988. The company has a 10-year agreement with Havelock Lime (a Division of Dickenson Mines Ltd.) to supply up to 400 000 t of raw stone on a yearly basis.

Canada Cement Lafarge Ltd. also produces aggregate for its subsidiary, Permanent Concrete Ltd.

Gypsum has been produced from Intervale as required (5 000 to 25 000 t/a). However, due to the scale-down and closure of the Havelock cement operation, no significant production has been recorded in recent years.

DEVELOPMENT Continued operation. Stone is supplied to Havelock Lime.

EMPLOYEES 6 persons in 1989.

LIMESTONE

Elmtree Resources Ltd. 21 P/13W

COMPANY Elmtree Resources Ltd., P.O. Box 665, Bathurst, New Brunswick E2A 3Z6. Telephone: (506) 546-6382. The Executive Officer and President is A. Buzas; the Manager and Vice-President is G.M. Doucet.

RIGHTS 245.9 ha Mining Lease No. 249, under the Mining Act, Chapter M-14.1, S.N.B. 1985.

LOCATION The Elmtree quarry is located about 20 km north of Bathurst near the Village of Petit Rocher, Gloucester County (Figure 20).

HISTORY A quarry has existed on this site since 1880 and was operated on a 1814 t/a basis from 1930 to 1960 by Elmtree Co-op. Since 1960, it was operated on an intermittent basis until 1978 when it was acquired by Elmtree Resources Limited. Following extensive trenching and mapping, the quarry was expanded to include a crushing and screening plant, and a large storage facility.

PRESENT OWNERSHIP Elmtree Resources Ltd.

RESERVES AND GRADE Reserves appear to be adequate in the explored area for a few more years of operation at current production levels. The cutoff grade is 50% CaO.

PRODUCTION Approximately 60 000 to 90 000 t of limestone is quarried and crushed annually. It is primarily sold to the smelter at Belledune for flux. Some material is marketed as agricultural lime, construction stone, and fertilizer filler.

DEVELOPMENT Continued operation.

EMPLOYEES 12 persons (average number).

Elmtree Resources Ltd. (Sormany) 21 O/9

COMPANY Elmtree Resources Ltd., P.O. Box 665, Bathurst, New Brunswick E2A 3Z6. Telephone: (506) 546-6382. The Executive Officer and President is A. Buzas, and the Manager and Vice-President is G.M. Doucet.

RIGHTS 84.3 ha Quarry Lease No. 27 under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

171.3 ha Mining Lease No. 248 and 16.2 ha Claim Block 993 under the Mining Act, Chapter M-14.1, R.S.N.B. 1986.

LOCATION This deposit is located about 30 km west of Bathurst, adjacent to the Millstream River (Figure 20).

HISTORY Although the limestones near Sormany were mapped by Davies in 1959, it was not until 1982 that Elmtree Resources Ltd. mapped and sampled the deposit in detail. Two holes were drilled to further test the extent and grade continuity of the limestone at depth. Results were encouraging enough to proceed with site preparation for quarry development.

PRESENT OWNERSHIP Elmtree Resources Ltd.

RESERVES AND GRADES Initial exploration results indicated an excess of 4 000 000 t of high-grade calcic limestone (53.0% CaO) suitable for quicklime and hydrated lime production.

PRODUCTION Some stone has been quarried and hauled to the main crushing facility at Elmtree, where it has been marketed as agricultural (ag) lime and smelter flux (see Armstrong Brook dolomite).

DEVELOPMENT In 1989, stone was hauled to the crushing facility at Elmtree where it was marketed as ag lime and various other products.

EMPLOYEES Manpower was provided by staff of Elmtree Resources Ltd.

Havelock Lime, a Division of Dickenson Mines Limited 21 H/13W

COMPANY Havelock Lime, P.O. Box 59, Havelock, New Brunswick E0E 1W0. Telephone: (506) 534-2311. The General Manager is L. Murray.

RIGHTS 182.4 ha Mining Lease No. 244 (includes plant); 282.9 ha Mining Lease No. 243 (operating quarry). All rights are under the Mining Act, Chapter M-14.1, S.N.B. 1985.

LOCATION The company operates a quarry at Samphill, about 5 km west of Havelock. A processing facility is situated less than 1 km east of the Village (Figure 20).

HISTORY Havelock Lime, formerly Havelock Lime Works Ltd., has been quarrying in the area since 1939. The original company was incorporated in 1964, and in 1970 a subsidiary company, Havelock Processing Ltd., was formed to manage the manufacturing of quick and hydrated lime. In 1984, Dickenson Mines Ltd. purchased the Havelock group of companies.

PRESENT OWNERSHIP Dickenson Mines Limited.

RESERVES AND GRADE Less than 5 000 000 t of 95% $CaCO_3$ are estimated to remain at Havelock's Samphill quarry following current extraction practices. However, this tonnage can be increased if a greater overburden-to-stone stripping ratio can be economically achieved.

PRODUCTION The company has traditionally processed about 300 000 to 400 000 t of stone annually. Chemical process stone (for use as flux in nonferrous smelters, glass industry, pulp and paper mills and fibreglass), pulverized stone (for use in dusting mines and agricultural purposes), poultry grit, and crushed stone (for use as concrete aggregate and for general construction) are among the products currently produced.

DEVELOPMENT Expansion plans have been completed recently, with the construction of a new kiln. The 300 t/a annular-shaft kiln operated satisfactorily for much of 1989. The new kiln should realize significant fuel savings and provide long-term market competitiveness. Some stone is purchased from Lafarge Canada Inc. who operates a nearby quarry. Construction of a new 10 ton per hour hydrator was also completed in 1989.

Although some limestone was purchased from Lafarge Canada Inc., most of Havelock Lime's requirements were supplied from the Company's Samphill quarry. Investigations continued into the quality-control problems associated with limestone from Lafarge's McGee quarry. Geological work, including drilling, proved up additional high-quality limestone reserves on the property just north of the Havelock processing facility.

EMPLOYEES 44 persons (average number).

Upper Kent Lime Works Ltd. 21 J/12

COMPANY Upper Kent Lime Works Ltd. R.R. 3, Bath, New Brunswick E0E 1E0. Telephone: (506) 278-5359. Contact person is Douglas Lloyd.

RIGHTS Mining Lease No. 242 (16.2 ha) under the Mining Act, Chapter M-14.1, S.N.B. 1985.

LOCATION This deposit consists of marl occurring in the bottom of a partially drained lake at Maplehurst, 15 km north of the Village of Bath (Figure 20).

HISTORY The deposit has been worked since the late 1950s and was acquired by the present owners in 1973.

PRESENT OWNERSHIP Upper Kent Lime Works Ltd.

RESERVES AND GRADE It is estimated that 25 000 to 30 000 t of marl ranging between 85% and 95% $CaCO_3$ remains at this location.

PRODUCTION The water level has been lowered slightly and the marl is within 1 m of the surface. Marl is extracted from the lake bottom by a drag line, spread on the adjacent hillside to dry, and stockpiled. It is then screened to remove pebbles, twigs, etc., and trucked to local farmers for use in potato fields. The main operating period is late April to June. An additional two- to three-week period of operation typically occurs in the fall to stockpile material. Annual sales are in the order of 2000 to 2500 t.

DEVELOPMENT Continued operation.

EMPLOYEES 3-4 persons

SILICA

Chaleur Silica Limited 21 P/12E

COMPANY Chaleur Silica Limited, c/o Elmtree Resources Ltd., P.O. Box 665, Bathurst, New Brunswick E2A 3Z6. Telephone: (506) 546-6382. The Manager is Al Buzas.

RIGHTS Original King's Land Grant.

LOCATION The Bass River silica quarry is located south of Highway 11, approximately 6.5 km east of Bathurst, Gloucester County (Figure 20).

HISTORY The property was originally explored by East Coast Smelting and Chemical Company in 1961, but the property remained undeveloped until 1974 when World Wide Explorations opened a small quarry. It was purchased by Godin M-E in 1976. The operation was expanded and modernized, and is now operated under the name Chaleur Silica Limited. A sandblast sand plant, with 77-91 t/d capacity of bagged sand, was installed in 1979.

In 1983, five holes were drilled on a second property adjacent to the Nepisiguit River. Ten metres of siliceous stone similar to that already being quarried was intersected.

PRESENT OWNERSHIP The deposit is owned by A. Ronalds and G. Ronalds under an original King's Grant and mined under an agreement with Chaleur Silica Limited.

RESERVES AND GRADE Reserves are estimated to be in excess of 500 000 t of 95% SiO_2; however, most is inaccessible due to ownership problems.

PRODUCTION The quarry operates on a seasonal basis and has produced up to 60 000 t of silica annually. Markets are almost entirely dependent on the sale of silica flux to the smelter at Belledune; however, some blasting sand and nursery sand have been produced.

DEVELOPMENT In 1988, the operation was sold to Elmtree Resources Ltd. who intends to maintain production, pending market demand. No production was reported in 1989.

EMPLOYEES N/A

Sussex Silica Inc. 21 H/12E

COMPANY Baskatong Quarts Ltd., P.O. Box 337, N.D.G., Montreal, Québec, H4A 3P6. Telephone: 514-482-6357; and Lockhart Exploration Services Ltd., P.O. Box 515, 328 King St., Fredericton, N.B., E3B 5A6. Telephone: 454-3508. Mine Site: R.R.#3, Sussex, N.B. E0E 1P0. Telephone: 433-5890. Mine Manager is Robin Turner.

RIGHTS Mining Lease 241 (599.8 ha) and 24 claims (387 ha) under the Mining Act, Chapter M-14.1, S.N.B. 1985.

LOCATION This deposit of unconsolidated silica sand is about 16 km southwest of Sussex, immediately northeast of Cassidy Lake (Figure 20).

HISTORY The deposit was discovered in 1982. After identifying sufficient reserves of high-quality sand, a pilot plant was set up in 1983 for product testing and marketing. Full-scale production began in 1986.

PRESENT OWNERSHIP SKW Canada Inc., in trust. Baskatong Quarts Ltd. of Québec and Lockhart Exploration Services Ltd. have interests in the property.

RESERVES AND GRADE Approximately 9 000 000 t proven reserves and more than 22 000 000 t possible reserves of silica sand containing greater than 98% SiO_2 are indicated.

PRODUCTION Production from this mine began in the fall of 1986, consisting of several thousand tonnes of lump silica and sand of various sizes. The lump silica was used in the manufacture of silicon metal and

silicon carbide at Becancour, Québec. Existing capacity of the operation is estimated at 80 000 t/a.

DEVELOPMENT Plans to gradually expand into specialty marketable products including sand blasting material, filtration, tree nursery, decorative sands, and sands used in the manufacture of glass and fibreglass.

EMPLOYEES 7 persons in 1989.

CLAY PRODUCTS

L.E. Shaw Limited 21 I/4W

COMPANY L.E. Shaw Limited, Head Office: P.O. Box 2130, Lantz, Nova Scotia B0N 1R0. Plant and Quarry Office: P.O. Box 188, Chipman, New Brunswick E0E 1C0. Telephone: (506) 339-6605. The Manager is George Roberts.

RIGHTS The company owns about 40 ha of land. Quarriable substances are vested in the owner of the land in or on which they lie.

LOCATION The quarry is located about 3 km east of the plant in Chipman, New Brunswick (Figure 20).

HISTORY In 1929, the company opened a plant in the heart of the Minto coal field at Chipman to use waste shales from the coal mines in making brick and tile. Since 1935, raw material for the plant has been obtained from the shale quarry.

PRESENT OWNERSHIP L.E. Shaw Limited.

RESERVES AND GRADE The material is purple-red sandstone, shale, and siltstone from the Hurley Creek Formation.

DEVELOPMENT In 1989, the company continued to operate a brick plant using local red shale. The plant produces facing brick, drainage tile, partition tile, radial tile, interlocking tile, and flue liners. Quality acid-resistant brick can also be produced.

EMPLOYEES 25 to 40 persons for manufacturing plant and 1-2 for the quarrying operation.

PROCESSED (DIMENSION) STONE

Nelson Monuments Ltd. 21 H/12

COMPANY Nelson Monuments Ltd., P.O. Box 1220, Sussex, New Brunswick, E0E 1P0. Telephone: (506) 432-9000. The contact person is Mr. Merrill Nelson.

RIGHTS Stone is a quarriable substance and rights are therefore vested in the owner of the land in or on which it lies.

LOCATION The plant is located in Sussex, New Brunswick (Figure 20), but quarries have been operated in various places: Charlotte County and Hampstead in New Brunswick, and Vermillion Bay in Ontario.

HISTORY The company was founded in 1909, and in 1959 it was moved from Hopewell Cape to Sussex.

DEVELOPMENT The company continues to produce monuments, markers, curbing stone, and stone for landscaping use. Much of the granite sold in 1988 was imported from Ontario and Overseas.

EMPLOYEES An average of 28 persons.

Smith Cut Stone and Quarries Limited 21 I/2

COMPANY Smith Cut Stone and Quarries Limited, P.O. Box 69, Shediac, New Brunswick E0A 3G0. Telephone: (506) 532-6902. The President is Roy E. LeBlanc.

RIGHTS Stone is a quarriable substance and rights are therefore vested in the owner of the land in or on which it lies.

LOCATION Shediac, New Brunswick (Figure 20).

HISTORY Founded in 1818, this is the oldest stone quarrying company in New Brunswick. The Shediac sandstone quarry has provided building stone for numerous construction projects, including Moncton's Cathedral. For the last 25 years it has mainly provided cut stone for restoration and related building projects.

DEVELOPMENT The company continues to operate a stone fabrication plant using both local and imported stone. It has been involved in various restoration projects in the region.

EMPLOYEES 2 to 15 persons in 1989.

CRUSHED STONE

Major operations producing crushed stone for use as aggregate are centred around the Fredericton and Moncton areas. Both of these areas are deficient in good quality, coarse, surficial, granular aggregate materials.

In the Fredericton area, Diamond Construction Limited maintains a crushing operation at Springhill, on the south side of the Saint John River. The material crushed is a Silurian greywacke. On the north side of the river, Forbes and Sloat Limited crushes Mississippian basalt at a quarry at Douglas, just west of Fredericton.

In the Moncton area, Moncton Crushed Stone, a Division of Modern Construction Ltd., crushes granitic rocks of Precambrian age at a quarry at Stilesville, northwest of the city. Manufactured fine concrete aggregate is also produced by the operation, by blending crusher-produced fine aggregate with washed natural sand trucked in from the Rogersville area. H.E. Carson Limited also operates a quarry in metasedimentary rocks in the Stilesville area. To the east of Moncton, at Gaytons, Precambrian granitic rocks are crushed by Acadia Crushed Stone Division of Modern Construction Ltd., and by MacDonald's Paving and Construction Limited. C.M. Stewart Company Limited operates a quarry in basaltic rocks in the Campbellton area.

Brookville Manufacturing Company Limited near Saint John and Havelock Lime at Havelock produce crushed dolomite and limestone, respectively, for use as aggregate, in addition to their other lime products. Elmtree Resources Limited of Bathurst also produced crushed limestone for use as aggregate.

Preliminary estimates of stone production for 1989 are 2 250 000 t with a value of $15 228 000 (Table 3). In comparison, 1988 production was 2 960 000 t valued at $16 280 000.

SAND AND GRAVEL

Most sand and gravel pits in New Brunswick are operated on an intermittent, on-demand basis; many of these can produce only low-specification aggregate. The comparatively few permanent operations are found where large deposits of good quality material lie within economical trucking distance of high-demand, urban areas (e.g., the Saint John area).

The preliminary estimate of sand and gravel production in New Brunswick during 1989 is 9 039 000 t (Table 3). In comparison, production in 1988 was 10 300 000 t.

ENERGY RESOURCES

OIL AND NATURAL GAS

Irving Oil Limited 21 H/15

COMPANY Irving Oil Limited, P.O. Box 1421, Saint John, New Brunswick E2L 4K1. The President is A.L. Irving.

RIGHTS ONG lse/on-sh 74-1 (2153.7 ha) under the Oil and Natural Gas Act, Chapter O-2.1, R.S.N.B. 1976.

LOCATION The Stoney Creek field (Lease 74-1) is located 16 km south of Moncton (Figure 20).

HISTORY Lease 74-1 is in the 6th year of a ten-year term.

PRODUCTION Oil and natural gas operators for the field are Irving Oil Limited and Moncton Utility Gas Company, respectively. Natural gas production was 35 506 mcf (994 168 m^3) with no oil produced in 1989.

Year	Gas (m^3)	Oil (m^3)
1986	1 822 866	638.9
1987	1 744 683	494.8
1988	1 079 540	367.1
1989	994 168	---

COAL

NB Coal Limited 21 I/4, 21 J/1

COMPANY NB Coal Ltd., P.O. Box 520, Minto, N.B., E0E 1J0, President: Mr. A. Cormier. Parent Company: NB Power.

RIGHTS Coal Agreement under the Mining Act, Chapter M-14.1, S.N.B. 1985.

LOCATION The Minto-Chipman coalfield is approximately 60 km east-northeast of Fredericton (Figure 20).

HISTORY The first recorded coal mining in North America occurred near Grand Lake in 1639. The coal was exported to Massachusetts. Production was limited to a few thousand tonnes annually until the 1900s. Expansion of the coal mining industry was coincident with development of the railways, which not only provided transportation to markets in New Brunswick, Quebec, and the State of Maine, but were also large users of coal. Construction of the Grand Lake Generating Station in the early 1930s provided another market for coal.

In 1941 disposition of coal was: electric power generation, 10%; railways, 40%; and industrial (mainly pulp and paper mills), 50%. This was also the first year that strip mining accounted for 20% of the production. Since 1971 all production has been from stripping operations.

Low oil prices in the 1960s led to the decision to form a Crown Corporation that would phase out uneconomic operations while continuing to produce enough coal for the Grand Lake Generating Station. The 1973 Arab oil embargo and the rapid escalation in oil prices caused a change in the attitude toward burning coal. This ultimately led to the decision by NB Power to add a 200 Mw unit, which could be fuelled by oil or coal, to the Dalhousie Generating Station. In order to supply the necessary coal for

Dalhousie, NB Coal Ltd. purchased and erected on site a Marion 8200 dragline (Figure 7). This dragline, which first produced in 1979, accounts for 60% of the annual production.

Prior to 1978 mining companies did not have to be concerned about reclamation. This resulted in large areas of land that were not levelled but which did revegetate naturally. Other areas have been levelled and reforested. The present plan is to level areas and allow them to revegetate naturally. Abandoned highwalls are sloped to 45°.

In 1988, the 500 dragline was moved from the Fire Road-Bog Camp mine to the Little River mine because of the generation of low pH water at the Fire Road-Bog Camp site. Discharge waters from this site continue to be treated with lime in order to control acidity.

RESERVES 9 600 000 t of coal, proven.

PRODUCTION 505 800 t of coal (1989); 529 500 t of coal (1988)

DEVELOPMENTS The company has expanded efforts to level spoil piles created since 1978. Their plans are to be caught up with reclamation within 2 years and to have levelling coincide with mining.

In 1989, NB Coal Ltd. started site preparation work in the Coal Creek area for the erection of a Bucyrus Erie 1260 dragline. The first parts should arrive in late 1990 or early 1991.

EMPLOYEES 1989, an average of 200 persons.

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ABBREVIATIONS

cm – centimetre
m – metre
km – kilometre
g – gram
t – tonne
L – litre
ha – hectare
mgal – milligal
Hz – Hertz
M – mega (prefix for 1 000 000)
t/a – tonnes per year
t/d – tonnes per day

CONVERSIONS

Square miles (sq. mi.) × 2.589 988 = square kilometres (km^2)

Short tons × 0.907 184 = tonnes (t)

Acres (ac.) × 0.404 685 = hectares (ha)

For precious metals:
ounces per ton (oz./ton) × 34.285 71 = grams per tonne (g/t)

For oil (1 barrel = 42 U.S. gallons):
barrels × 0.158 987 3 = cubic metres (m^3)

For natural gas:
cubic feet (cu. ft.) × 0.028 316 85 = cubic metres (m^3)

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